Chapter 3

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- Matrix of Alternatives

3. Alternatives

This chapter describes management alternatives for the Great Dismal Swamp National Wildlife Refuge and the Nansemond National Wildlife Refuge. Each alternative addresses aspects of refuge management, including habitat management and public use. The first section describes management actions that are common to all the alternatives and that the Service plans to implement no matter which alternative is chosen. The next section describes the three alternatives in the format of goals, objectives, and strategies. Strategies are listed from those common to other alternatives to those specific to each alternative, when applicable. In this section there are three alternatives for the Great Dismal Swamp National Wildlife Refuge and two alternatives for the Nansemond National Wildlife Refuge. Last is a section that describes major strategies considered but eliminated from further consideration.

Lake Drummond.
Thousands of wintering tundra swans and snow geese are attracted to the lake each year. Waverley Traylor.

Following the text on the alternatives for each refuge you will find a matrix that clearly defines the differences among the alternatives. Each matrix compares and contrasts the alternatives by their specific management actions and strategies. These actions and strategies, in turn, are grouped according to the Refuge Goals. Generally, the matrices are a summary of the alternatives chapter.

Formulating Alternatives

The alternatives are packages of complementary management strategies and specific actions for achieving the missions of the National Wildlife Refuge System (Refuge System) and the Service, the vision and goals of the refuge, and the purpose for which the refuges were established. They propose different ways of supporting the goals and responding to key issues, management concerns, and opportunities identified during the planning process.

Great Dismal Swamp NWR

The alternatives were guided by different approaches to habitat management, public use, and the level of funding and staffing required to support basic refuge operations. *Alternative A* illustrates the current management, or"no action," of the refuge and provides a baseline for comparing and contrasting other alternatives. *Alternative B* directs the refuge towards an optimal level of habitat management and public use based on the prevailing vision for the refuge at the time of its establishment in 1974. *Alternative C* reduces emphasis on habitat management compared to current levels of operation but retains significant expansion of visitor services and public use.

Nansemond NWR

Nansemond NWR has always been a non-funded, non-staffed satellite refuge of the Great Dismal Swamp NWR. The refuge has been maintained at a custodial level due to its relatively small size and lack of funding and staffing. *Alternative A* will describe the current level of modest, custodial operations. *Alternative B* will maintain the current level of operational support by the Service but direct more emphasis towards developing a partnership that will allow an entity other than the Service to take over the management and stewardship of Nansemond NWR.

The Compatibility Determination

Federal law and Service policy provide the direction and planning framework to protect the System from incompatible or harmful human activities, and to insure that Americans can enjoy Refuge System lands and waters. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57), is the key legislation regarding management of public uses and compatibility. The compatibility requirements of the Refuge Improvement Act were adopted in the Service's Final Compatibility Regulations and Final Compatibility Policy published October 18, 2000 (Federal Register, Vol. 65, No. 202, pp 62458-62496). This Compatibility Rule changed or modified Service Regulations contained in Chapter 50, Parts 25, 26 and 29 of the Code of Federal Regulation (USFWS 2000c). To view the policy and regulations online, go to http://policy.fws.gov/library/00fr62483.pdf.

The National Wildlife Refuge System Improvement Act of 1997 (the Act) and Service Regulations require that an affirmative finding be made of an activity's "compatibility" before such activity or use is allowed on a national wildlife refuge. A compatible use is one, "…that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge." Six priority, wildlife-dependent uses that are to be considered at each refuge are defined in the Act and Regulation. These are: hunting, fishing, wildlife observation and photography, environmental education and interpretation. These priority, wildlife-dependent uses may be authorized on a refuge when they are compatible (as defined above), and not inconsistent with public safety. Not all uses that are determined compatible may be allowed. The refuge has the discretion to allow or disallow any use based on other considerations such as public safety, policy and available funding. However, all uses that are allowed must be determined compatible. Except for consideration of consistency with State laws and regulations as provided for in subsection (m) of the Act, no other determinations or findings are required to be made by the refuge official under this Act or the Refuge Recreation Act for wildlife-dependent recreation to occur (Refuge Improvement Act).

Compatibility determinations for the six priority public uses and other expected activities were completed for the Great Dismal Swamp National Wildlife Refuge (Appendix E). Each use (with some restrictions) was found to be compatible with both the mission of the System and the purposes for which the refuge was established. The compatibility determinations for these activities are being issued as part of this CCP. However, these compatibility determinations may be reviewed sooner

than the mandatory review date, or before the Comprehensive Conservation Plan process is completed, if new information reveals unacceptable impacts or incompatibility with refuge purposes.

Compatibility determinations were not completed for Nansemond National Wildlife Refuge for the refuge is closed to all public use. The Service's proposed action includes pursuit of cooperative management opportunities at Nansemond NWR. In the event that additional wildlife dependent recreational opportunities can be provided, we will issue compatibility determinations as required by compatibility policy, including public comment opportunities.

Great Dismal Swamp National Wildlife Refuge

Management Highlights: Common to All Alternatives

Goal 1: (Habitat)

Habitat Management

- Access for basic research and educational activities related to the habitats within the refuge will be allowed.
- Pine/pocosin habitats will be maintained with prescribed fires to reduce fuel accumulations.

Hydrologic Management

- The existing water control structures throughout the 150-mile network of canals and ditches will be maintained and operated to slow the rate of surface drainage from the refuge.
- Seasonal surface flooding will be monitored to assure that normal flooding patterns are maintained to avoid disruption of ground foraging neotropical migratory birds.
- Ground water levels will be maintained within one foot of the surface in Atlantic white cedar stands where sufficient water management capabilities exist.
- Water levels in the ditches and canals will be monitored to conserve

water for fire suppression operations.

- Water control structures will be adjusted to promote water conservation without flooding and damaging refuge roads or creating drainage problems for adjacent private property.
- Research and survey partnerships will be promoted with research institutions, the Corps of Engineers, and other government organizations to improve basic knowledge and interpretation of the refuge watershed.
- The refuge will support efforts to restore natural surface flow of water in those areas where off-refuge developments (i.e. US Highway 158, Norfolk-Southern Railroad) create abnormally wet conditions on the refuge.
- The refuge will cooperate with adjacent landowners in Pasquotank County to promote the proper operation and maintenance of the Newland flood-control dike.
- The Corps of Engineers will continue to release water from Lake Drummond to supply the Dismal Swamp Canal within the parameters established by the Dismal Swamp Act of 1974. The release of water will cease when lake water levels fall to 15.75 MSL at the Lake Drummond Reservation.

Fire Management

- The refuge will continue to maintain cooperative agreements with the appropriate state and local fire suppression agencies to support basic wildfire suppression operations on the refuge.
- The refuge will maintain fire suppression capabilities necessary to complement state and local fire suppression forces to contain and suppress wildfires within the refuge.
- Prescribed burning and limited mechanical clearing within those areas that are justified by the need to reduce fuel accumulations or address fire management concerns under the Wildlands Urban Interface program will be implemented.

Goal 2: (Trust Resources/Wildlife Species)

Endangered Species

- Pine/pocosin habitat will be restored and maintained for red-cockaded woodpeckers when these areas qualify for funding support for fuel reductions and/or addressing issues under the Wildlands Urban Interface program.
- Red-cockaded woodpeckers will be re-introduced to suitable habitat within the refuge.

- Artificial nesting cavities will be installed to enhance nesting habitat for red-cockaded woodpeckers.
- Nesting success will be monitored.

Neotropical Migratory Birds

- Develop and support research and survey projects to monitor neotropical migratory bird populations and habitat preferences.
- Support banding partnerships for neotropical migratory birds.
- Monitor and adjust water management, road maintenance, and habitat management activities to enhance habitat for neotropical migratory birds.

Waterfowl Management

- Monitor and manage public access to Lake Drummond to allow the area to be used by wintering tundra swans and snow geese.

Black Bears

- Monitor refuge black bear populations in cooperation with the state wildlife management agencies and research/education institutions.
- Provide sites on the refuge for emergency relocation of nuisance bears in partnership with the state wildlife management agencies.

Goal 3: (Land Protection)

Habitat Protection

- The Service will acquire the remaining properties within the approved land acquisition boundary when willing sellers offer these lands to the refuge.
- Staff will cooperate and support efforts by neighboring cities and counties to restore and protect key remnants of restorable Great Dismal Swamp habitat outside the refuge acquisition boundary.
- Staff will collaborate with and provide technical assistance to cities and counties when they are reviewing development proposals adjacent the refuge and within historic range of the Great Dismal Swamp in order to assess the impacts of the development to wildlife associated with the refuge and reduce and/or eliminate adverse impacts to the refuge ecosystem.
- The refuge will promote the maintenance of key wildlife corridors by recommending appropriate wildlife passages be incorporated into highway engineering.

- The refuge will partner with The Nature Conservancy, state wildlife agencies, and other non-government organizations to protect and restore seasonally flooded wetlands within the refuge watershed.
- The refuge will promote hydrologic restoration to reduce or eliminate hydrologic disruptions created by off-refuge developments (e.g. US Highway 158, Norfolk-Southern Railroad).
- The refuge will maintain and post refuge boundary and resolve boundary disputes as they are discovered.

Goal 4: (Public Use)

Environmental Education. *Educators will be encouraged to use the refuge for wildlife oriented outdoor classrooms. Filming of refuge educational video. USFWS.*

Hunting

- White-tailed deer hunting will continue on specified dates in October and November.

Fishing/Boating

- Year-round access to Lake Drummond via the Feeder Ditch will be permitted for canoes, kayaks, and motorized boats of 10 horsepower or less.
- Access to Lake Drummond via the Railroad Ditch entrance will be provided for canoes, kayaks, and motorized boats of 25 horsepower or less during April 1 through June 15.
- The use of watercraft such as jet skis will be prohibited on Lake Drummond.

Environmental Education

- Teacher activity guides and videos will be provided to educators.
- Educators will be encouraged to use the refuge for wildlife-oriented outdoor classrooms.
- Environmental education programs will be conducted at local schools and libraries.
- Refuge will loan field study equipment for use on outdoor classroom sites.
- Teacher training partnerships with universities and colleges will be developed.

Interpretation

- Refuge publications on general refuge information and current issues will be provided to refuge visitors and the general public.
- Staff and volunteers will provide interpretive programs.

- Interpretive media, kiosks, and boardwalks at Washington Ditch and Jericho Lane will be maintained.

Wildlife Observation and Photography

- Approximately 50 miles of roads will be maintained for hiking and bicycling on Washington Ditch and Jericho Lane.
- Limited vehicle access to Lake Drummond via the Railroad Ditch entrance will be provided to nature-based tourism groups, outfitters, local municipalities, and other partners to promote wildlife observation.
- Railroad, West, and Interior Ditch Roads will be maintained for limited vehicle access to Lake Drummond.
- Washington Ditch observation deck and Interior Ditch pier will be maintained on Lake Drummond.
- The Dismal Town Trail will be maintained at the Washington Ditch entrance.

Volunteers

- Staff will work to recruit volunteers through on-site contacts, news releases, and off-refuge programs.
- Develop volunteer opportunities through intern partnerships with educational institutions.
- Conduct volunteer training workshops.

Outreach

- Staff and volunteers will provide off-refuge programs to civic groups.
- Staff will provide technical assistance to local city and county governments in addressing those issues that affect wildlife resources within the refuge watershed.
- Staff will work in partnership with The Nature Conservancy and other conservation groups to enhance outreach concerning common wildlife conservation issues.
- The refuge headquarters will provide basic refuge orientation to refuge visitors Monday-Friday.

Alternative A: Current Management-No Action

Management Focus: In the time since the refuge was established in 1974, the refuge operations have focused on the activities summarized as follows:

Land Acquisition

The Service actively pursued negotiations with willing sellers to acquire land within the approved acquisition boundary after the first 49,097 acre tract was donated by Union Camp Corporation through The Nature Conservancy. The refuge had expanded to over 100,000 acres by the early 1980's, and it now incorporates over 111,200 acres in Virginia and North Carolina.

Most of the land has been purchased with Land and Water Conservation Funds (LWCF). Unfortunately, the refuge was unable to obtain LWCF funding in the early 1990's, and some offers to sell land to the refuge were rescinded when the Service was unable to pursue the negotiations due to the lack of funding. To overcome this funding barrier, the Service began submitting some of the offered tracts to the Migratory Bird Commission to pursue funding generated by the Migratory Bird Hunting and Conservation Stamp Act, as these seasonally-flooded forests offered considerable potential as nesting habitat for wood ducks and neotropical migratory birds. The Commission approved several of these tracts, and about 4,000 acres have been added to the refuge using this funding source since 1998.

Rationale: The Dismal Swamp Act of 1974 authorized the Service to establish the refuge and acquire over 100,000 acres that had been designated for inclusion in the refuge. This approved acquisition boundary had been developed through extensive public input resulting from the Dismal Swamp Study Act of 1972. The seasonally-flooded habitat representative of the Great Dismal Swamp was being cleared and developed at an alarming rate through the mid-1980's. Failure to aggressively pursue the tracts from willing sellers would have greatly diminished the refuge's ultimate potential to restore and protect a unique ecosystem and the wildlife populations associated with these habitats.

Hydrologic Management

Nearly 30 water control structures have been constructed or restored

throughout the 150-mile network of ditches and canals found on the refuge. Most of these structures slow the rate of drainage from the refuge, and some structures can divert water into refuge areas where water may be needed for fire management and other habitat restoration purposes.

Rationale: The landowners who owned the land that is now within the refuge recognized long ago that the 150-mile network of ditches had accelerated drainage of the Great Dismal Swamp, and this drainage was not always beneficial to their stewardship of the land, especially when water was needed for fire suppression. Thus, several water control structures were already in place when the refuge was established.

Water is the life-blood of the Great Dismal Swamp ecosystem as is the case with any wetlands. The refuge incorporates considerable areas of fire-dependent habitats where surface and ground hydrology affect the dynamics of wildfires as well as prescribed fires. Surface water is needed to contain and suppress potentially-destructive wildfires, and ground and surface water is needed to contain prescribed fires and inhibit the ignition of the swamp's peat surface.

Some habitats, such as the rare Atlantic white cedar forests, require a high water table to become established. Accelerated drainage has promoted the conversion of the cedar forest to habitats that favor drier conditions.

Habitat Restoration

The restoration and maintenance of habitats associated with the Great Dismal Swamp ecosystem has supported the diversity of wildlife populations. The restoration of marshes and bogs has provided habitat for waterfowl, marsh and wading birds, and bald eagles. Maintaining fire-dependent communities such as the pine/pocosin habitats has enhanced their value to black bears, neotropical migratory birds, and the planned re-introduction of the federally-listed endangered red-cockaded woodpeckers. The restoration of Atlantic white cedar forests enhances nesting habitat for several species of neotropical migratory birds as well as rare butterflies and moths that favor these areas.

Habitat restoration utilizing a combination of mechanical clearing, timber sales, tree planting, and prescribed burning began in 1985 on representative habitats throughout the refuge including remnant marshes and bogs, Atlantic white cedar forests, cypress stands, and

pine/pocosin habitats. Most of the habitat treatments were in relatively small areas of 50 acres or less. However, aerial ignition of prescribed fires has been used to burn as much as 1,300 acres in a single treatment.

Rationale: Fire has been an important influence on the Great Dismal Swamp ecosystem. Prior to human intervention in the swamp ecosystem, fires created clearings that allowed different types of vegetation and trees to regenerate and thrive, resulting in diverse habitats and wildlife populations. In some instances, fires burned depressions in the peat that collected surface water and formed marshes, bogs, and ponds. Lake Drummond is believed to have been formed by a large peat fire that occurred several thousand years ago.

However, managing fire dependent communities in peat soils has been complicated. As an urban refuge, major wildfires could threaten private property and public safety. In addition, the refuge incorporates only a remnant of the original Great Dismal Swamp, and the refuge hydrology has been disrupted to a point where complete hydrologic restoration would not be likely. Permanent hydrologic changes have made it unlikely that natural wildfires can be relied upon to maintain representative habitats, for the natural hydrology could not be replicated sufficiently to create the hydrologic conditions that used to influence natural wildfires. Therefore, today's wildfires would carry the risk of permanently eliminating some habitats as well as threatening the lives and property of refuge neighbors. As a result of these complications, forest management techniques that included mechanical clearing, timber sales, and herbicide applications have been used to imitate the effects of fire in those areas where the direct use of fire could not be safely utilized.

Road Maintenance. *Culvert installation under road bed to prevent flood damage. USFWS.*

Road Restoration and Maintenance

Approximately 80-100 miles of roads have been restored and maintained to support refuge resource management operations and, to a more limited extent, to provide visitor access for hunting, environmental education, and hiking/bicycling. These roadbeds usually consisted of the spoil provided by the construction of the ditch network, so the reliability and quality of the roads were varied. Restoration of some of the roads required raising the elevation of the roadbeds higher above the swamp surface and placing a considerable amount of gravel on their surface. Trees were removed from the edges of some portions of the road system to expose the roads to sunlight, allowing them to dry more quickly. Culverts had to be installed at numerous locations to prevent erosion damage during floods and to replace old culverts that had deteriorated in the naturally acidic conditions that exist within the refuge. The

roads must be mowed several times during the warmer months, and encroaching trees and shrubs must be cut with heavy-duty side-mounted mowers in 2-3 year cycles.

Rationale: Reasonably dependable roads were needed to support the resource management operations as well as the limited visitor access to the refuge. Most of the roads were constructed of ditch spoil that was of poor quality and turned into a slippery quagmire during wet weather. Although most of the roads are narrow and are not suitable for use during wet weather, several key roads have been restored sufficiently to provide seasonal access for habitat and fire management operations. Annual, seasonal mowing activities reduce the probability that fires will be ignited by the exhaust systems of vehicles and equipment, enhance the roads for use as fire breaks, and reduce wear and tear on refuge vehicles and equipment.

Goal 1: (Habitat) **Manage the area for the primary purpose of protecting and preserving a unique and outstanding ecosystem, as well as protecting and perpetuating the diversity of animal and plant life therein.**

Program: Forest Management

Rationale for Program: "A timber management program to include the continuing harvest of select timber species under controlled conditions" is one of the primary objectives of the refuge (USDI 1974). Forest management programs are directed towards restoring and enhancing the natural habitat diversity of the refuge by restoring or mimicking natural forces that once maintained habitat and wildlife diversity of the refuge.

Objective: Restore 2,000 acres of Atlantic white cedar forests by 2006 using helicopters and/or other specialized equipment to remove trees that were destroyed or severely damaged by Hurricane Isabel.

Rational for Objective: Hurricane Isabel inflicted considerable changes to the refuge landscape on September 18, 2003. Several

thousand acres of Atlantic white cedar forests were destroyed. Without restoration, significant Atlantic white cedar acreage will be lost.

Much of the refuge is inaccessible to conventional logging equipment, making it logistically difficult or impossible to salvage forest resource and promote cedar restoration. Helicopters and/or other specialized equipment will make more Atlantic white cedar stands accessible to salvage and restoration as well as be less environmentally disruptive than conventional logging equipment.

Strategies:

- Issue permits to contractors who can use helicopters and/or other specialized equipment to salvage Atlantic white cedar trees that were blown down by Hurricane Isabel.
- Permit conditions will outline "in kind" services that will require the contractors to repairs refuge roads and provide other administrative support needed to support salvage and restoration operations.

Forest Management.
Atlantic white cedar stand, a rare forest habitat. USFWS.

Objective: Restore 1,000 acres of Atlantic white cedar by 2019.

Rationale for Objective: Approximately 8,000 acres of Atlantic white cedar (AWC), a rare forest habitat, are 100+ years old and are expected to be lost to natural mortality within the next 20-30 years. If AWC is not regenerated in these areas, red maple and other undesirable species will replace Atlantic white cedar in these stands.

Strategies:

- Utilize commercial harvests of mature Atlantic white cedar to clear areas sufficiently for natural regeneration on a total of 1,000 acres that are reasonably accessible by existing refuge roads.
- Utilize approved herbicides to reduce competition from competing vegetation in mature Atlantic white cedar stands that are not easily accessible to harvesting equipment.
- Promote partnerships with state forest management agencies, research institutions, and non-government resource management organizations to develop and evaluate forest management techniques.

Objective: Improve 10,000 acres of pine/pocosin habitat.

Rationale for Objective: The pine/pocosin forest, a fire dependent habitat, is being encroached on by adjacent pine and hardwood communities. The enhancement of the pine/pocosin habitat addresses the refuge's implementation legislation to maintain and restore habitats.

The pine/pocosin habitat is prime foraging for the black bears and some of the highest densities of female bear ranges include this habitat type. The red-cockaded woodpecker is listed as "endangered" under the Federal Endangered Species Act and once inhabited the area now incorporated into the refuge. Biologists involved with recovery of this endangered species have indicated that the pine/pocosin forests within the refuge are potentially valuable habitat for the re-introduction of the Red-cockaded Woodpecker. Approximately 2000 acres, of the 10,000 acres, pine/pocosin will be managed for the establishment of a viable Red-cockaded Woodpecker breeding population of 10 active clusters. These activities will support the refuge mission of "protecting and preserving a unique and outstanding ecosystem" as well as support agency recovery efforts for endangered species.

Strategies:

- Immplement hardwood removal and aggressive prescribed burning on 10,000 acres.
- Maintain these areas with prescribed fires occurring every 3 to 5 years.

Water Management. *Refuge staff makes adjustments to water control structures as needed to inhibit flood damage to refuge roads.* USFWS.

Objective: Maintain approximately 30 acres of the Remnant Marsh.

Rationale for Objective: The Remnant Marsh once covered over 250 acres and provided brood and feeding habitat for waterfowl and wading birds. The marsh has evolved into a maple-gum forest over the decades due to the exclusion of fire and mechanical clearing, so that the area is barely recognizable as marsh. Wildlife species associated with this habitat, particularly several species of waterfowl and wading birds, would likely cease to inhabit the refuge with the loss of marsh habitat.

Strategies:

- Maintain approximately 30 acres of the marsh that have already been restored by subjecting the area to prescribed fires every 3 to 5 years.
- Monitor vegetation and ground and surface water conditions to evaluate habitat maintenance techniques.

Program: Hydrologic Management

Rationale for Program: The 150 miles of ditches constructed since 1760 have created a drier forested wetlands system, resulting in significant ecological changes. Reversing this drying trend by slowing the rate of drainage supports the refuge mission of "protecting and perpetuating" the ecosystem. These efforts support refuge operations

to implement prescribed burning, reduce the probability of ground fires and catastrophic wildfires, and improve brood habitat for wood ducks. Moreover, Congress recognized the importance of conserving water for the proper stewardship of the Great Dismal Swamp by directing in the refuge's establishing legislation that the operation of the Dismal Swamp Canal could not adversely affect the refuge.

Objective: Maintain and/or restore hydrologic conditions to sustain or improve viability of wetland communities and their associated wildlife species.

Rationale for Objective: Water conservation and manipulation is required to support the ecosystem restoration mission. Restoring seasonal flooding of forests supports nesting and brood habitat for migratory waterfowl (e.g. wood ducks). Monitoring surface flooding conditions to assure that conditions are favorable to ground foraging neotropical migratory birds supports refuge and agency objectives. Maintaining higher ground water levels within Atlantic white cedar forest supports restoration and maintenance of this rare habitat.

Strategies:

- Conserve water to restore natural hydrologic conditions within areas where cypress, maple, and gum are the dominant habitats.
- Monitor surface flooding conditions to assure that abnormal flooding conditions do not interfere with ground-foraging neotropical birds.
- Maintain ground-water levels within one foot of the surface within Atlantic white cedar stands.

Objective: Maintain and operate water control structures to support flood control and fire management operations.

Rationale for Objective: Water handling and conservation capabilities support prescribed fire and fire suppression operations.

Strategies:

- Adjust water control structures as needed to inhibit flood damage to refuge roads.
- Promote research and survey partnerships with research institutions, Corps of Engineers, and other government organizations to improve basic knowledge and interpretation of the refuge watershed.
- Cooperate with adjacent landowners along the Pasquotank River to allow proper operation and maintenance of the Newland flood-control dike.

- Assure that refuge water conservation measures do not result in flooding of adjacent neighboring private property.
- Continue current cooperative arrangement with the Corps of Engineers in which water release from Lake Drummond ceases at 15.75 MSL.
- Maintain water levels in ditches to support fire suppression and prescribed fire needs.
- Maintain water levels in ditches to support fire management needs in pine forests and red-cockaded woodpecker recovery areas.
- Support efforts to restore natural surface flow in those areas where off-refuge developments (e.g. US Highway 158, Norfolk-Southern Railroad) create abnormally wet conditions.

Program: Fire Management

Rationale for Program: Fire is known to have been an important natural force in maintaining natural habitat diversity within the refuge ecosystem. Fires ignited by humans and lightning created clearings that allowed different species of plants to flourish and maintained forest stands of varying ages. Fires also created depressions in the organic soils that evolved into marshes, bogs, and lakes. Prescribed burning activities reintroduce fire to the refuge ecosystem, creating habitat diversity that supports the basic mission of the refuge to "protect and perpetuate" the ecosystem; agency objectives to provide habitat for migratory waterfowl and Neotropical migratory birds; and the agency objectives for endangered species recovery.

Fire Management.
Prescribed burning activities reintroduce fire to the ecosystem. USFWS.

Objective: Maintain current capabilities to detect and suppress wildfires.

Rationale for Objective: Fire detection and suppression operations reduce the probability of long-lasting catastrophic wildfires that would threaten human health and property surrounding the refuge. Major highways, three airports, and considerable residential and commercial properties would be threatened if fires escaped from the refuge. Lightning from summer thunderstorms ignites most refuge wildfires, so most wildfires occur when surface and ground water conditions are favorable for ground fires of long duration. Long-lasting peat fires have been known to emit smoke for months and reduce air quality for lengthy periods of time. Early detection/suppression of fires reduces the chances of large fires developing; thus, reducing suppression time and expenses.

Strategies:

- Maintain 80-100 miles of roads to support fire suppression access for the refuge and Dismal Swamp State Natural Area.
- Utilize lightning detection services and aerial surveys to detect wildfires during periods of high fire probability.
- Establish and maintain cooperative agreements with state and local fire suppression agencies to support fire detection and suppression.

Trust Resources. *Pine/ pocosin habitat for red-cockaded woodpeckers. USFWS.*

Objective: Implement hazard reduction prescribed burning within areas that are designated by national fire management parameters.

Rational for Objective: Hazard reduction prescribed burning reduces the amounts of fuels in the forest. In reducing this fuel source, the probability of major fires of long duration, which are difficult and expensive to suppress as well as pose a greater threat to human health and private property, is also reduced.

Strategies:

- Implement hazard reduction burns within designated areas.
- Participate in wildlands urban interface programs that support reduction of fuel accumulations and development of fire breaks where off-refuge development and smoke-sensitive locations are threatened by refuge wildfires.

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Goal 2: (Trust Resources/ Wildlife Species) **Protect and enhance Service trust resources and other significant species.**

Program: Red-cockaded Woodpecker Reintroduction

Rationale for Program: The red-cockaded woodpecker is listed as "endangered" on the Federal endangered species list. This species is known to have once existed within mature pine forests within the refuge, and small colonies have been discovered in southeastern Virginia and northeastern North Carolina. Woodpecker biologist have determined that the refuge's pine forest hold considerable potential for red-cockaded woodpecker foraging and nesting habitat and the refuge has been identified as a possible RCW recovery site. Habitat management required for the recovery effort will support the basic refuge mission of ecosystem restoration and enhancement.

Objective: Re-introduce a viable population of red-cockaded woodpeckers into appropriate refuge habitat.

Strategies:

- Implement mechanical clearing and prescribed burning to restore habitat in the designated area of approximately 2000 acres appropriate for red-cockaded woodpeckers.
- Translocate red-cockaded woodpeckers from suitable donor population into designated area of the refuge.
- Promote the Safe Harbor program to engage private landowners in recovery efforts.
- Install artificial nesting cavities to support woodpecker nesting.

Program: Neotropical Migratory Birds

Rationale for Program: The large blocks of contiguous forests attract nearly 100 species of neotropical migratory birds to seasonally inhabit the refuge, and nearly 70 species to nest within the refuge. Atlantic coast populations of neotropical migrants are generally declining due to the loss of habitat. The refuge, however, is one of the few areas where populations are stable.

The large populations and number of species of neotropical migratory birds make the refuge an ideal location to support long-term monitoring and studies of these species. Neotropical banding has been ongoing for decades within the refuge, and the Smithsonian Institution has been tracking nesting activities for neotropical migrants, particularly the Swainson's warbler, since 1990. These surveys provide some indications on the status of neotropical migrants within the refuge as well as the mid-Atlantic region of the United States. In addition, these surveys provide feedback that can be useful in adjusting refuge habitat management operations to support neotropical migratory birds.

Objective: Provide basic monitoring and survey support for neotropical migratory bird populations to regularly assess status of refuge populations.

Strategies:

- Develop and support partnerships with the Smithsonian Institution, state wildlife agencies, Natural Heritage programs, and other research institutions to monitor neotropical migrant populations and habitat preferences.

- Support banding partnerships for neotropical migrants.
- Adjust water management and other refuge habitat management operations to enhance habitat for neo-tropical migrants, particularly Swainson's warbler.

Program: Waterfowl Management

Waterfowl Management. *The seasonally flooded forest provides brood habitat for wood ducks. Wood duck. Waverley Traylor.*

Rationale for Program: The large blocks of seasonally flooded forest provide natural cavities for wood duck nesting. Remnant marshes and bogs as well as the man-made ditches provide brood habitat for wood ducks. Lake Drummond provides resting habitat for estimated peak populations of 10,000-15,000 wintering tundra swans and snow geese that feed on agricultural fields within the refuge watershed.

Objective: Insure conditions for breeding and wintering waterfowl currently using the refuge are maintained.

Strategies:

- Monitor and maintain existing marsh and bog restoration sites to support brood habitat for wood ducks.
- Monitor and manage public access to Lake Drummond to allow the area to be used by wintering tundra swans and snow geese.

Program: Black Bear Management

Rationale for Program: The refuge contains one of the largest concentrations of black bears on the east coast of the United States. This large bear population, however, exists within an area that is surrounded by considerable commercial and residential development as well as major highways. The continued development of off-refuge lands has decreased the amount of bear habitat surrounding the refuge. Increased traffic along existing highways and highway improvements along the refuge perimeter may eliminate natural corridors through which bears now traverse to other areas of habitat within the refuge watershed. These developments create nuisance bear issues, as bears visit residential areas, disrupt traffic, and increase crop depredation. Moreover, the off-refuge development may eventually result in a genetically isolated black bear population.

The continued loss of habitat and corridors outside the refuge may eventually create the need to maintain or reduce the black bear population to levels that can be safely supported solely by the refuge.

Due to this concern, collaboration with biologists from the Virginia Department of Game and Inland Fisheries and the North Carolina Wildlife Resources Commission began in 1997 to assess the status of bear populations within the refuge watershed and determine the desirability to controlling the refuge bear population. These collaborations led to planning a two-day recreational hunt in late November or early December that would be conducted to assure no significant reduction of the bear population. This hunt would provide a wildlife-oriented recreational opportunity as well as provide the refuge with information on the physical parameters of the bear population. Thus, the refuge completed compatibility determinations and added "black bears" to the current big game hunting program on the refuge in 1998.

Habitat Protection. *Promote the maintenance of key wildlife corridors by recommending appropriate wildlife passages be incorporated into highway designs. US Hwy 17. USFWS.*

The black bear is symbolic, in the view of the public, of the wildlife associated with the Great Dismal Swamp NWR ecosystem. The habitat and large size of the refuge means that the refuge will likely always contain a large black bear population. Therefore, an expectation exists for the refuge to have significant stewardship responsibilities for this highly visible bear population.

Objective: Maintain a black bear population that is viable and within the carrying capacity of the refuge.

Strategies:

- Continue to monitor black bear populations in cooperation with the state wildlife agencies and research/educational institutions.
- Evaluate monitoring data to measure achievements towards meeting population viability goals.
- Provide sites for emergency relocations of black bears in partnership with state wildlife management agencies.
- Work with states to acquire data on bears harvested under crop depredation permits and bear hunting.
- In partnership with the states and non-governmental organizations, seek funding to conduct studies to compliment previous refuge bear research that focuses on the demography of black bears, their genetics, population size, growth and dispersal patterns.
- Cooperate with state wildlife management agencies in developing and implementing emergency response to nuisance bears and enhancing educational outreach related to bears within the refuge watershed.

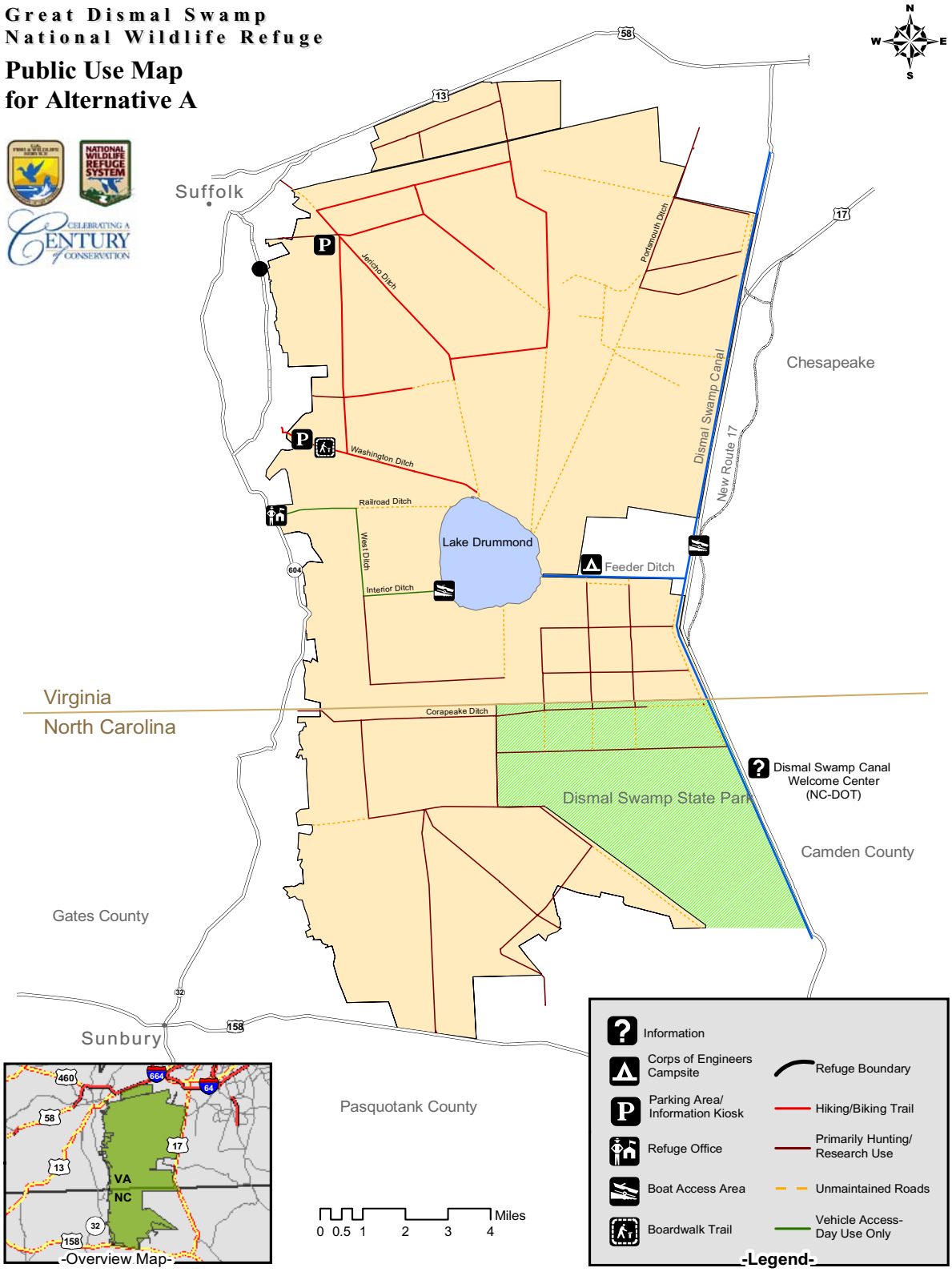
Goal 3: (Land Protection) **Provide protection of those areas within the Great Dismal Swamp NWR watershed that either are remnants of Great Dismal Swamp habitat or can be restored to Great Dismal Swamp habitat.**

Program: Habitat Protection and Restoration

Rationale for Program: In 1972, the Dismal Swamp Study Act (P.L. 92-478) directed the Secretary of the Interior to study the desirability and feasibility of protecting and preserving the Great Dismal Swamp and Dismal Swamp Canal. Initially, a 210,000-acre study area was delineated to be considered for protection and restoration, and the Secretary ultimately recommended that approximately 123,000 acres be acquired by state and federal agencies for protection and stewardship. Over the past three decades, much of the land that was excluded from recommended public ownership has been developed and converted to other uses. This loss of habitat poses serious adverse ramifications for the refuge and surrounding communities. First, the loss of wildlife corridors threaten to make the refuge an ecological isolate, thus threatening the health of wildlife populations and decreasing "societal carrying capacities" for some wildlife populations such as black bear. Second, the refuge has arguably become the largest urban wildlife refuge in the United States, as nearby development now supports neighboring human population of 1.6 million people. This adjacent human population and development complicates the habitat restoration mission of the refuge, since ecosystem perpetuation will involve hydrologic restoration and aggressive fire management that could potentially affect refuge neighbors. Finally, the continued development of historic "Great Dismal Swamp" habitat threatens the quality of life for humans within the watershed through the development of flood-prone areas where hydrologic disruption is significant, by a reduction of air and water quality, and by the loss of open space.

The protection and restoration of the remaining restorable habitats would mitigate trends of creating an ecologically isolated refuge and creating societal carrying capacities for refuge wildlife populations, thus maintaining a higher quality of life for citizens in neighboring communities.

Figure 3-1.


Great Dismal Swamp
National Wildlife Refuge
Public Use Map
for Alternative A
CELEBRATING A CENTURY of CONSERVATION
N
W
E
S
Suffolk
Chesapeake
Virginia
North Carolina
Gates County
Camden County
Pasquotank County
Sunbury
Lake Drummond
Dismal Swamp State Park
Dismal Swamp Canal
New Route 17
Jericho Ditch
Portsmouth Ditch
Washington Ditch
Railroad Ditch
West Ditch
Interior Ditch
Feeder Ditch
Corapeake Ditch
Dismal Swamp Canal
Welcome Center
(NC-DOT)
58
13
17
604
32
158
460
664
64
VA
NC
-Overview Map-
0 0.5 1 2 3 4
Miles
Information
Corps of Engineers Campsite
Parking Area/ Information Kiosk
Refuge Office
Boat Access Area
Boardwalk Trail
Refuge Boundary
Hiking/Biking Trail
Primarily Hunting/ Research Use
Unmaintained Roads
Vehicle Access- Day Use Only
-Legend-

Boating and Fishing Access. *Many groups travel to Lake Drummond via the Dismal Swamp Canal/Feeder Ditch route. Chesapeake Public boat ramp on US Hwy 17. USFWS.*

Objective: Pursue the protection and restoration of historic Great Dismal Swamp habitat within the refuge watershed, focusing on the area identified within the original 210,000 acre study area.

Strategies:

- Acquire the remaining properties within the current acquisition boundary when they are offered by willing sellers (approximately 4,000 acres).
- Cooperate and support efforts by neighboring cities and counties to restore and protect key remnants of restorable Great Dismal Swamp habitat outside the refuge acquisition boundary.
- Collaborate with and provide technical assistance to cities and counties when they are reviewing development proposals adjacent the refuge and within the historic range of the Great Dismal Swamp.
- Promote the maintenance of key wildlife corridors by recommending appropriate wildlife passages be incorporated into highway designs.
- Partner with The Nature Conservancy, state wildlife agencies, and other non-government organizations to protect and restore seasonally-flooded areas within the refuge watershed.
- Promote hydrologic restoration when opportunities develop (e.g. US Highway 158, Norfolk and Southern Railroad, Dismal Swamp Canal).

Goal 4: (Public Use) **Establish a public use program that will encourage awareness, understanding, appreciation and stewardship of the Great Dismal Swamp NWR ecosystem while complementing the refuge resource management objectives.**

Program: Hunting Opportunities

Rationale for Program: Hunting is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

Providing wildlife-dependent recreational opportunities, like hunting, helps to foster an appreciation for wildlife and a sense of stewardship for the environment. There are limited public hunting opportunities in southeastern Virginia and northeastern North Carolina. By continuing to allow hunting on the refuge, we provide the surrounding communities additional hunting opportunities, particularly to those who do not have access to private lands.

The refuge has been deer hunting on the refuge since 1979. In 1998 a Compatibility Determination was completed and black bear hunting was added to the big game hunting program. This bear hunt has not yet been implemented. Our proposal is to implement the bear hunt as a component of Alternative B. The details of this hunt are outlined there.

Objective: Provide a safe, quality hunt program and promote special hunting opportunities on the Great Dismal Swamp NWR.

Strategies

- Provide an annual deer hunt program for archery and shotgun in designated zones of the Great Dismal Swamp NWR during specific days in October and November (13 day shotgun and archery concurrently in October and November).

Program: Boating and Fishing Access

Rationale for Program: Fishing is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

Fishing on Lake Drummond is allowed year round during daylight hours when accessed via the Feeder Ditch (10 horsepower limit). The refuge provides the opportunity for more convenient access through the Railroad Ditch entrance during the height of the fishing season through a special permit process (25 horsepower limit).

Objective: Provide access to Lake Drummond for fishing and boating during designated fishing season.

Strategies:

- Lake Drummond is open for boating and fishing during daylight hours, access via the Feeder Ditch, year round.
- Continue to provide a fishing and boating season permit for April 1 to June 15, to Lake Drummond, access via Interior Ditch

Road, during daylight hours.
- Promote fishing in southeastern Virginia and northeastern North Carolina by partnering with local municipalities and other organizations for off-site fishing events.

Program: Environmental Education

Rationale for Program: Environmental Education is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

Nature is an excellent vehicle to inspire children to learn. Besides instilling an awareness and appreciation of their local environment, it provides an excellent reason to encourage children to read, it provides "real-life" application of math theory, and introduces children to their local history. Many schools throughout the country have found that when nature was used as a medium of learning math, reading, social studies, and, of course, science, test scores improved and children were excited about learning. In Alternative A, the focus will be specifically on those communities adjacent to the refuge boundary. Programs, outreach, etc., for the environmental education program will center on Suffolk and Chesapeake, Virginia, and Gates, Camden, and Pasquotank Counties in North Carolina.

Wildlife Observation. *Approximately 50 miles of trails are maintained for hiking and biking. Washington Ditch Trail.USFWS.*

Objective: Provide a quality comprehensive environmental education program to the communities adjacent to the refuge boundary that incorporates the U.S. Fish & Wildlife Service message, the cultural and natural history of the Great Dismal Swamp NWR, the impact of man on the environment, and the resource management practices used by the refuge staff to protect and preserve the Great Dismal Swamp NWR.

Strategies:
- Continue to offer teacher activity guides and Refuge videos for the classroom.
- Outreach to teachers in the adjacent communities to encourage utilization of the refuge as an outdoor classroom.
- Provide field study equipment and field guides for loan to visiting school trips.
- Continue to participate in occasional environmental education programs at schools in the adjacent communities.

Program: Interpretation

Rationale for Program: Interpretation is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

The Great Dismal Swamp is an integral part of the natural and cultural heritage of the region. Interpretive experiences, including guided walks, display panels, exhibits and other programs will both assist refuge visitors getting oriented to the trails and refuge, and members of the community in understanding the role of the swamp and man's impact on the environment.

Objective: Provide quality interpretive experiences, to the adjacent communities, designed to increase awareness, understanding and support for the swamp's unique ecosystem and the refuge's resource management practices.

Strategies:

- Produce and provide refuge publications on general refuge information and current issues.
- Provide occasional staff/volunteer-led orientation and programs at the refuge headquarters.
- Provide occasional staff/volunteer-led orientation and walks at Washington Ditch and Jericho Lane.
- Provide occasional off-site programs at schools, libraries, and civic meetings.
- Maintain current interpretive panels, boardwalks and kiosks at Washington Ditch and Jericho Lane.
- Continue to exhibit at local festivals and events as staff time permits.

Program: Wildlife Observation and Photography

Rationale for Program: Wildlife observation and photography are two of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

Experiencing the outdoors and seeing wildlife in its natural habitat instills a sense of appreciation in people. Appreciation leads to care, concern and stewardship. By providing opportunities for people to experience the outdoors and observe wildlife, the refuge will gain support for the protection of such a unique ecosystem.

Objective: Provide opportunities for refuge visitors to view, photograph, and appreciate wildlife in the habitat as an effort to promote understanding of the impact of man's footprint on the fragile ecosystem of the Great Dismal Swamp NWR.

Strategies:

- Maintain Washington Ditch Trail and the Lake Drummond observation pier at Washington Ditch.
- Maintain approximately 50 miles of trails for foot or bike touring.
- Continue to provide access permits to nature-based tourism groups and outfitters, such as canoeing and kayaking, as well as local municipalities, to promote wildlife observation.
- Maintain Railroad/ West/Interior Ditch trail and boat ramp.
- Continue to provide auto access permits onto Railroad/ West/ Interior Ditch Roads to Lake Drummond.
- Coordinate with the Army Corps of Engineers to provide year-round water access of Lake Drummond via the Feeder Ditch.

Facilities. *Headquarters on Desert Road. USFWS.*

Program: Volunteers

Rationale for Program: In all alternatives, volunteers are a valuable asset, bringing a unique local history and knowledge to the refuge's programs and, at times, providing technical assistance to refuge wildlife management activities.

Objective: Provide opportunities for people to donate their time and talents to the Refuge, building community support and providing a financial savings to the Service.

Strategies:

- Identify volunteer opportunities and establish "job descriptions" for those opportunities.
- Distribute volunteer internship opportunities to local colleges and universities.
- Conduct two volunteer training workshops per year.
- Hold an annual volunteer recognition and appreciation event.
- Recruit volunteers through on-site contacts, media releases, on and off-site programs, and volunteer organizations.

Program: Outreach

Rationale for Program: Due to health or "comfort level", many people do not visit the refuge. Some have never really considered visiting the

refuge. These people may be members of civic organizations or enjoy other community events throughout the year. By providing off-site exhibits at local festivals, or evening presentations for various civic organizations, a broader audience can be introduced to the refuge and the wonders of the Great Dismal Swamp NWR. At the current level, outreach is selective as staff time is very limited.

Objective: Coordinate with Virginia and North Carolina state and local partners to participate in community events and provide input on local environmental issues.

Strategies:

- Serve as advisors in regional government conservation planning.
- Continue to work with conservation groups, such as The Nature Conservancy and the Izaak Walton League of America, to partner in finding solutions to area environmental issues.
- Share refuge facilities (e.g. conference room at the refuge headquarters) with state and local agencies.
- Offer off-site outreach programs, by request and as staff schedules permit, to local civic and environmental organizations with special emphasis on providing various audiences information about refuge management issues, including forest management, fire management, bear management, and protection of trust resources.

Program: Facilities

Rationale for Program: The refuge will continue to use the reception area of the headquarters located at 3100 Desert Road, Suffolk, Virginia, as a visitor contact area. The headquarters also includes a small conference room that is used for limited interpretive programs.

Objective: Utilize current refuge headquarters located in Suffolk, Virginia, to orient visitors to the refuge.

Strategies:

- Visitors will continue to be directed to the refuge's headquarters for orientation and information, Monday through Friday, 7:30 am to 4:00 pm.

Alternative B: Service's Preferred Alternative

Management Focus: Resource management operations and visitor services will be expanded if funds become available to add facilities and staff to support these operations. Phases of expansion would be anticipated as funds are allocated to enhance specific refuge operations that are identified and summarized as follows:

Habitat Management

- Atlantic white cedar restoration, utilizing commercial timber sales and herbicide applications, will occur on a maximum of 8,000 acres.
- Approximately 10,000 acres of pine/pocosin habitat will be restored and maintained utilizing mechanical clearing and prescribed burning.

Rationale:

- An estimated 8,000 acres of mature, mixed Atlantic white cedar forests will be lost to competing species if regeneration of these stands is not initiated within the next two decades.
- Restoration of pine/pocosin habitats will promote the recovery of fire-dependent communities as well as provide potential habitat for the endangered red-cockaded woodpecker.

Land Protection

- Restoration and protection of the remaining remnants of Great Dismal Swamp habitat within the refuge watershed will be encouraged through partnerships.
- Hydrologic restoration will be encouraged in those areas where off-refuge development has disrupted surface and ground water hydrology.

Rationale:

- Restoration and protection of swamp remnants and wildlife corridors will prevent the refuge from becoming an ecological isolate.
- Restoration and protection of prior-converted farmlands within the watershed will provide wintering habitat for tundra swans and snow geese.
- Hydrologic restoration will enhance the refuge's ability to restore habitats on the refuge as well as reduce the potential of off-refuge

flooding of farms, highways, and residential areas.

Public Use

- Wildlife-dependent recreational, interpretive, and educational opportunities will be increased and supported from staffed facilities in Suffolk and Chesapeake, Virginia, and Sunbury, North Carolina.

Rationale:

- The establishing legislation for the refuge implied that providing wildlife-dependent recreational opportunities should be an important secondary management objective for the refuge.
- Neighboring communities in Virginia and North Carolina have clearly demonstrated a demand for wildlife-dependent recreational opportunities.
- Expanded visitor service opportunities would enable the refuge to introduce the public to the National Wildlife Refuge System and the U.S. Fish & Wildlife Service, to better promote the basic mission of ecosystem restoration, and to strengthen the refuge's partnerships with neighbors in the restoration and protection of key resources throughout the large refuge watershed.

Goal 1: (Habitat) **Manage the area for the primary purpose of protecting and preserving a unique and outstanding ecosystem, as well as protecting and perpetuating the diversity of animal and plant life therein.**

Program: Great Dismal Swamp National Wildlife Refuge Natural Areas

Rationale for Program: The Great Dismal Swamp NWR has long been recognized for its stewardship of unique habitats. The pond pine woodlands/pocosin and the Atlantic white cedar forests have been viewed by resource management professionals as globally-rare community types. The refuge was established for the primary purpose of restoring and protecting a unique ecosystem, so the refuge incorporates bogs, marshes, and forests that used to be part of a vast seasonally-flooded ecosystem that once covered at least 500,000 acres in Virginia and North Carolina.

The refuge has been assigned several special designations in recognition of the unique natural features incorporated into the refuge as well as to recognize the significant contributions of the refuge to the stewardship of wildlife resources. The refuge has been designated as a National Natural Landmark, requiring periodic status reports to the National Park Service on the overall condition of the refuge habitats. The North Carolina Natural Heritage Program has designated the North Carolina portion of the refuge as a Natural Heritage Area because the refuge incorporates habitats and plants that are rare in that state. Most recently, the Virginia Audubon Council identified the refuge as an Important Bird Area, recognizing the refuge as part of a global network of areas that contribute to the conservation of bird populations.

Research Natural Areas (RNA) on National Wildlife Refuges are part of a national network of reserved areas under various ownerships. This network is the result of a designation system recognized by other federal land management agencies and the Federal Committee on Ecological Reserves. RNA's are intended to represent the full array of North American ecosystems; biological communities, habitats, and phenomena; and geological and hydrologic formation and conditions. They are areas where natural processes are allowed to predominate without human intervention. However, under certain circumstances, deliberate manipulation is used to maintain unique features that the RNA was established to protect.

Forest Management. *Atlantic white cedar restoration site.* USFWS.

Public Use Natural Areas (PUNA) are relatively undisturbed ecosystems or sub-ecosystems that are available for use by the public with certain restrictions for protecting the area. Such an area must possess exceptional value or quality in illustrating or interpreting an element of the natural heritage of the Nation. This designation is fostered only by the National Wildlife Refuge System, and it is separate and distinct from the RNA designation system.

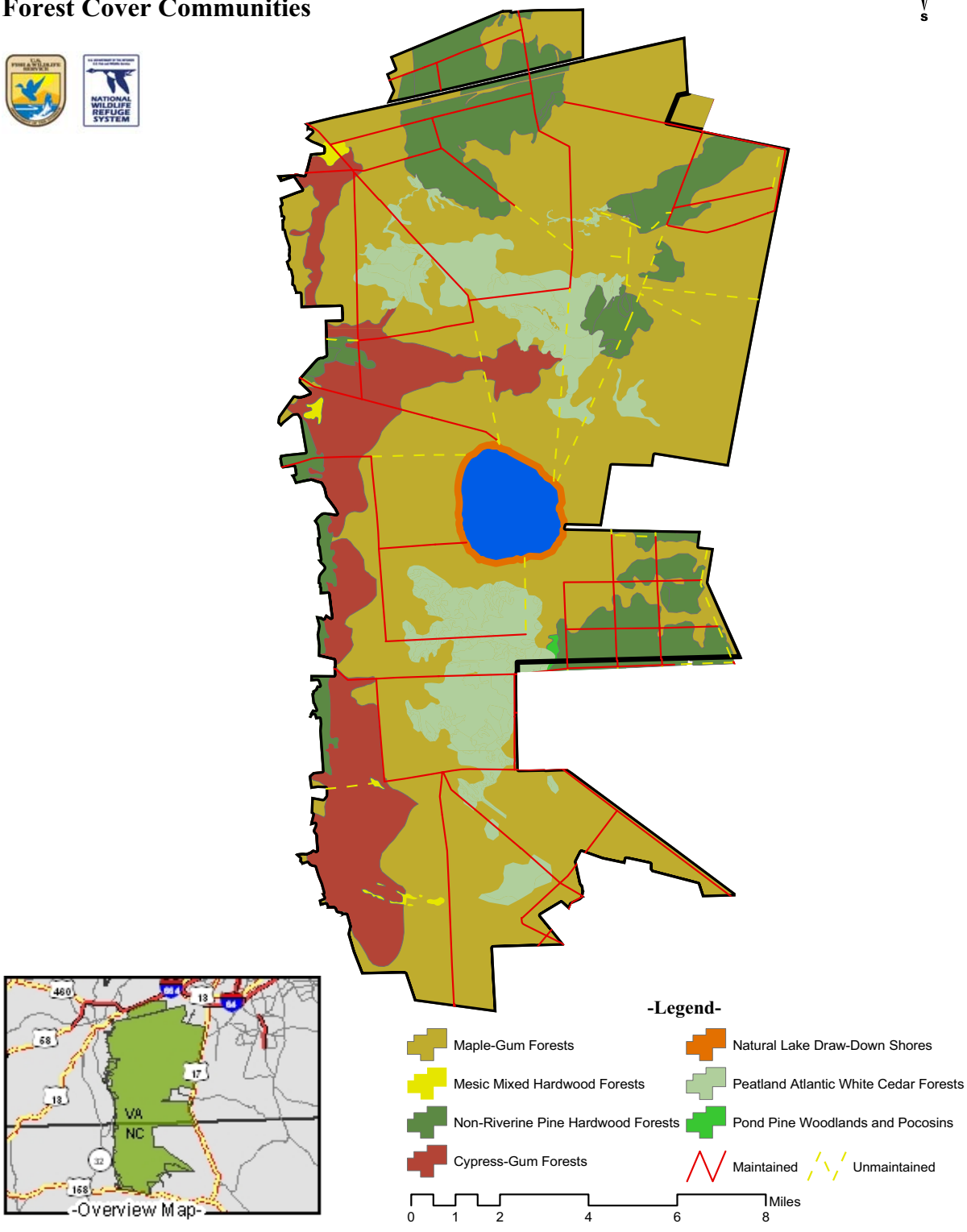
Objective: Establish Research Natural Areas to include remnant Atlantic white cedar forests and mesic islands within the areas identified as Unit 1 (Northeast) and Unit 2 (Gates County) of the Wilderness Review (see Appendix F) by 2010.

Rationale for Objective: The refuge was established to restore and protect a unique ecosystem. Atlantic white cedar forests and mesic islands are key components that have characterized the historic Great Dismal Swamp ecosystem. While the wilderness review concluded that these areas were not suitable for wilderness designation, these key components should be recognized as being critical to representing remnants of the natural biological diversity of the Great Dismal Swamp.

Figure 3-2

Great Dismal Swamp
National Wildlife Refuge

Forest Cover Communities



Strategies:

- Identify and designate a maximum of 1,000 acres of Atlantic white cedar forests within Unit 1 (Northeast) of the Wilderness Review as Research Natural Areas.
- Identify and designate a maximum of 500 acres of mesic islands as Research Natural Areas within Unit 2 (Gates County) of the Wilderness Review.

Objective: Establish Public Use Natural Areas within Unit 4 (Washington Ditch) and Unit 5 (Lake Drummond) of the Wilderness Review by 2010.

Rationale for Objective: The Lake Drummond scenery has remained largely unchanged over the centuries despite the fact that logging, ditching, and road construction have surrounded the lake. The Washington Ditch was originally constructed by George Washington's slaves in the 1760's, and the entire area along the Washington Ditch has been logged prior to the establishment of the refuge. Nevertheless, the history of the area, the fact that the Washington Ditch area was part of the original 49,000 acres that were donated to establish the refuge, and the fact that refuge visitors associate this primary visitor entrance as part of the "natural" Great Dismal Swamp argue for minimal development of this part of the refuge.

Strategies:

- Establish the 3,000 acre Lake Drummond as a Public Use Natural Area.
- Establish the Washington Ditch corridor as a Public use Natural Area.

Program: Forest Management

Rationale for Program: "A timber management program to include the continuing harvest of select timber species under controlled conditions" is one of the primary objectives of the refuge (USDI 1974). Forest management programs are directed towards restoring and enhancing the natural habitat diversity of the refuge by restoring or mimicking natural forces that once maintained habitat and wildlife diversity of the refuge.

Objective: Restore 2,000 acres of Atlantic white cedar forests by 2006 using helicopters and/or other specilized equipement to remove trees that were destroyed or severely damaged by Hurricane Isabel.

Rational for Objective: Hurricane Isabel inflicted considerable changes to the refuge landscape on September 18, 2003. Several thousand acres of Atlantic white cedar forests were destroyed. Without restoration, significant Atlantic white cedar acreage will be lost.

Much of the refuge is inaccessible to conventional logging equipment, making it logistically difficult or impossible to salvage forest resource and promote cedar restoration. Helicopters and/or other specialized equipment will make more Atlantic white cedar stands accessible to salvage and restoration and will be less environmentally disruptive than conventional logging equipment.

Strategies:

- Issue permits to contractors who can use helicopters and/or other specialized equipment to salvage Atlantic white cedar trees that were blown down by Hurricane Isabel.
- Permit conditions will outline "in kind" services that will require the contractors to repairs refuge roads and provide other administrative support needed to support salvage and restoration operations.

Objective: Restoration of 8,000 acres of Atlantic white cedar forest by 2019.

Rationale for Objective: Approximately 8,000 acres of Atlantic white cedar, a rare forest habitat, are 100+ years old and are expected to be lost to natural mortality within the next 20-30 years. If AWC is not regenerated in these areas, red maple and other less desirable species will replace Atlantic white cedar in these stands.

Strategies:

- Utilize commercial harvests of mature Atlantic white cedar to clear areas sufficiently for natural regeneration on 2,000 acres that are reasonably accessible by existing refuge roads.
- Utilize approved herbicides on 6,000 acres to reduce competition from competing vegetation in mature Atlantic white cedar stands that are not easily accessible to harvesting equipment.
- Promote partnerships with state forest management agencies, research institutions, and non-government resource management organizations to develop and evaluate forest management techniques.

Objective: Improve 10,000 acres of pine/pocosin habitat.

Rationale for Objective: The pine/pocosin forest, a fire dependent habitat, is being encroached on by adjacent pine and hardwood communities. The enhancement of the pine/pocosin habitat addresses the refuge's implementation legislation to maintain and restore habitats. The pine/pocosin habitat is prime foraging for the black bears and some of the highest densities of female bear ranges include this habitat type. The red-cockaded woodpecker is listed as "endangered" under the Federal Endangered Species Act and once inhabited the area now incorporated into the refuge. Biologists involved with recovery of this endangered species have indicated that the pine/pocosin forests within the refuge are potentially valuable habitat for the re-introduction of the Red-cockaded Woodpecker. Approximately 2000 acres, of the 10,000 acres, pine/pocosin will be managed for the establishment of a viable Red-cockaded Woodpecker breeding population of 10 active clusters. These activities will support the refuge mission of "protecting and preserving a unique and outstanding ecosystem" as well as support agency recovery efforts for endangered species.

Strategies:

- Implement hardwood removal and aggressive prescribed burning on 10,000 acres.
- Maintain these areas with prescribed fires occurring every 3 to 5 years.

Objective: Maintain approximately 250 acres of the Remnant Marsh.

Rationale for Objective: The Remnant Marsh once covered over 250 acres and provided brood and feeding habitat for waterfowl and wading birds. The marsh has evolved into a maple-gum forest over the decades due to the exclusion of fire and mechanical clearing, so that the area is barely recognizable as a marsh. Wildlife species associated with this habitat, particularly several species of waterfowl and wading birds, would likely cease to inhabit the refuge with the loss of marsh habitat.

Strategies:

- Maintain approximately 30 acres of the marsh that have already been restored by subjecting the area to prescribed fires every 3 to 5 years.
- Monitor vegetation and ground/surface water conditions to evaluate habitat maintenance techniques.
- Restore remaining acreage of the marsh utilizing mechanical clearing and prescribed burning to expand the total Remnant Marsh to 250 acres.

Program: Hydrologic Management

Rationale for Program: The 150 miles of ditches constructed since 1760 have created a drier forested wetlands system, resulting in significant ecological changes. Reversing this drying trend by slowing the rate of drainage supports the refuge mission of "protecting and perpetuating" the ecosystem. These efforts support refuge operations to implement prescribed burning, reduce the probability of ground fires and catastrophic wildfires, and improve brood habitat for wood ducks. Moreover, Congress recognized the importance of conserving water for the proper stewardship of the Great Dismal Swamp by directing in the refuge's establishing legislation that the operation of the Dismal Swamp Canal could not adversely affect the refuge.

Objective: Maintain and/or restore hydrologic conditions to sustain or improve viability of wetland communities and their associated wildlife species.

Rationale for Objective: Water conservation and manipulation is required to support the ecosystem restoration mission. Restoring seasonal flooding of forests supports nesting and brood habitat for migratory waterfowl (e.g. wood ducks). Monitoring surface flooding conditions to assure that conditions are favorable to ground foraging neotropical migratory birds supports refuge and agency objectives. Maintaining higher ground water levels within Atlantic white cedar forest supports restoration and maintenance of this rare habitat.

Strategies:

- Conserve water to restore natural hydrologic conditions within areas where cypress, maple, and gum are the dominant habitats.
- Monitor surface flooding conditions to assure that surface flooding does not interfere with ground-foraging neotropical migratory birds.
- Maintain ground-water levels within one foot of the surface within Atlantic white cedar stands.

Objective: Maintain and operate water control structures to support flood control and fire management operations.

Rationale for Objective: Water handling and conservation capabilities support prescribed fires and fire suppression operations.

Strategies:

- Adjust water control structures as needed to inhibit flood damage to refuge roads.
- Promote research and survey partnerships with research institutions, Corps of Engineers, and other government organizations to improve basic knowledge and interpretation of the refuge watershed.
- Cooperate with adjacent landowners along the Pasquotank River to allow proper operation and maintenance of the Newland flood-control dike.
- Assure that refuge water conservation measures do not result in flooding of adjacent neighboring private property.
- Continue current cooperative arrangement with the Corps of Engineers in which water release from Lake Drummond ceases at 15.75 MSL.
- Maintain water levels in ditches to support fire suppression and prescribed fire needs.
- Maintain water levels in ditches to support fire management needs in pine forests and red-cockaded woodpecker recovery areas.
- Support efforts to restore natural surface flow in those areas where off-refuge developments (e.g. US Highway 158, Norfolk-Southern Railroad) create abnormally wet conditions.
- Add water control structures to the Portsmouth/East Ditch watersheds if needed to implement prescribed burning operations within pine forests north of Lake Drummond that will restore and maintain fire-dependent habitats.
- Remove beavers and nutria, using lethal means, when habitat damage or interference with water management strategies (e.g. flooding private property) is detected.
- Control invasive plant species if major infestations are detected in waterways and marshes.
- Develop GIS surface flooding models to provide continuous assessment of water management strategies on wildlife populations and habitat conditions.

Fire Management. *Fire is known to have been an important natural force in maintaining natural habitat diversity within the refuge ecosystem.* Prescribed burn. USFWS.

Program: Fire Management

Rationale for Program: Fire is known to have been an important natural force in maintaining natural habitat diversity within the refuge ecosystem. Fires that were ignited by humans and lightning created clearings that allowed different species of plants to flourish and maintained forest stands of varying ages. Fires also created depressions in the organic soils that evolved into marshes, bogs, and

lakes. Prescribed burning activities reintroduces fire to the refuge ecosystem, creating habitat diversity that supports the basic mission of the refuge to "protect and perpetuate" the ecosystem; agency objectives to provide habitat for migratory waterfowl and neotropical migratory birds; and the agency objectives for endangered species recovery. Fire detection/suppression and hazard-reduction burningoperations reduce the probability of long lasting catastrophic wildfires that would threaten human health and property surrounding the refuge.

Objective: Maintain current capabilities to detect and suppress wildfires.

Rationale for Objective: Fire detection/suppression operations reduce the probability of long-lasting catastrophic wildfires that would threaten human health and property surrounding the refuge. Major highways, three airports, and considerable residential and commercial properties would be threatened if fires escaped from the refuge. Lightning from summer thunderstorms ignite most refuge wildfires, so most wildfires occur when surface and ground water conditions are favorable for ground fires of long duration. Long-lasting peat fires have been known to emit smoke for months and reduce air quality for lengthy periods of time. Early detection/suppression of fires reduces the chances of large fires developing; thus, reducing suppression time and expenses.

Strategies:

- Maintain 80-100 miles of roads to support fire suppression access for the refuge and Dismal Swamp State Natural Area.
- Utilize lightning detection services and aerial surveys to detect wildfires during periods of high fire probability.
- Establish and maintain cooperative agreements with state and local fire suppression agencies to support fire detection and suppression.
- Acquire additional access easements near the North Ditch and Corapeake Ditch to improve emergency access to isolated portions of the refuge.

Objective: Implement hazard reduction prescribed burning within areas that are designated by national fire management parameters.

Rational for Objective: Hazard reduction prescribed burning reduces the amounts of fuels in the forest. This would reduce the probability of major fires of long duration, which are difficult and expensive to suppress, as well as pose a greater threat to human health and private property.

Strategies:

- Implement hazard reduction burns within designated areas.
- Participate in wildlands urban interface programs that support reduction of fuel accumulations and development of fire breaks where off-refuge development and smoke-sensitive locations are threatened by refuge wildfires.

Goal 2: (Trust Resources/ Wildlife Species) **Protect and enhance Service trust resources and other significant species.**

Program: Red-cockaded Woodpecker Reintroduction

Reintroduction of red-cockaded woodpeckers. *The red-cockaded woodpecker is a listed species on the Federal endangered species list. USFWS RCW logo. USFWS.*

Rationale for Program: The red-cockaded woodpecker is listed as "endangered" on the Federal endangered species list. This species is known to have once existed within mature pine forests within the refuge, and small colonies have been discovered in southeastern Virginia and northeastern North Carolina. Woodpecker biologists have determined that the refuge's pine forests hold considerable potential for red-cockaded woodpecker foraging and nesting habitat and the refuge has been identified as a possible RCW recovery site. Habitat management required for the recovery effort will support the basic refuge mission of ecosystem restoration and enhancement. The woodpecker favors mature pine forest with relatively open understory maintained by frequent fires.

Approximately 2,000 acres of pine/pocosin habitat within the refuge along the Virginia/North Carolina border have been identified as potential woodpecker habitat. A combination of mechanical clearing and prescribed burning will be required to restore and maintain this habitat. This portion of the refuge has an adequate road and ditch system to support equipment access and water transport capabilities to support the habitat restoration operations. Additional potential habitat exists within pine forests on the Dismal Swamp State Natural Area and on the refuge north of Lake Drummond, but these areas are problematic for inclusion into an aggressive prescribed fire program. The state park area contains significant fuel accumulations due to the exclusion of fires for decades, and some of the park's access roads may require extensive repairs before they can support access for fire equipment. The pine forests north of Lake Drummond may also require road rehabilitation to provide adequate access for fire equipment. In addition, urban interface issues (Norfolk/Southern Railroad, Hampton Roads Regional Airport,

US Highway 58/460, commercial/residential development) along the refuge's northern boundary increase the complexity of prescribed burning in these forests.

Objective: Re-introduce a viable population of red-cockaded woodpeckers into appropriate refuge habitat.

Strategies:

- Implement mechanical clearing and prescribed burning to restore habitat in the designated area of approximately 2000 acres appropriate for red-cockaded woodpeckers.
- Translocate red-cockaded woodpeckers from suitable donor population into designated area of the refuge.
- Promote the Safe Harbor program to engage private landowners in recovery efforts.
- Install artificial nesting cavities to support woodpecker nesting.

Program: Neotropical Migratory Birds

Rationale for Program: The large blocks of contiguous forests attract nearly 100 species of neotropical migratory birds to seasonally inhabit the refuge, and nearly 70 species to nest within the refuge. Atlantic coast populations of neotropical migrants are generally declining due to the loss of habitat. The refuge, however, is one of the few areas where populations are stable. The large populations and number of species of neotropical migratory birds make the refuge an ideal location to support long-term monitoring and studies of these species. Neotropical banding has been ongoing for decades within the refuge, and the Smithsonian Institution has been tracking nesting activities for neotropical migrants, particularly the Swainson's warbler, since 1990.

Objective: Provide basic monitoring and survey support for neotropical migratory bird populations to regularly assess status of refuge populations.

Rationale for Objective: Surveys provide some indications on the status of neotropical migrants within the refuge as well as the mid-Atlantic region of the United States. In addition, these surveys provide feedback that can be useful in adjusting refuge habitat management operations to support neotropical migratory birds.

Strategies:

- Develop and support partnerships with the Smithsonian

Institution, state wildlife agencies, Natural Heritage programs, and other research institutions to monitor neotropical migrant populations and habitat preferences.
- Support banding partnerships for neotropical migrants.
- Adjust water management and other refuge habitat management operations to enhance habitat for neotropical migrants, particularly Swainson's warbler.
- Develop surface flooding and successional models using GIS technology to evaluate habitat conditions that affect neotropical migratory birds.

Objective: Establish a neotropical migratory bird "focus area" by 2019, in which to focus habitat management and modeling, population surveys, and education and interpretation related to neotropical migratory bird populations.

Rationale for Objective: Annual surveys for the Swainson's warbler have been accomplished since the 1960's in the northwestern quadrant of the refuge. Therefore, these surveys actually predate the establishment of the refuge and provide a solid base of data with which to measure population trends and population response to habitat changes. By focusing on a portion of the refuge where considerable data exist, habitat management and monitoring techniques can be refined and be used to identify other areas of the refuge where maximizing neotropical migratory bird population density is feasible.

Strategies:
- Establish a neotropical migratory bird focus area near Jericho Lane.
- Develop clearings of 5-10 acres using tree-girdling or small clear-cuts to establish foraging areas for neotropical migratory birds.

- Develop a trail to one of the habitat management areas to enhance interpretive and educational opportunities for neotropical migratory birds.
- Work with Partners in Flight to promote research, education, and management of migratory birds on the refuge.

Program: Waterfowl Management

Rationale for Program: The large blocks of seasonally flooded forest provide natural cavities for wood duck nesting. Remnant marshes and bogs as well as the man-made ditches provide brood habitat for wood ducks. Lake Drummond provides resting habitat for estimated peak

populations of 10,000-15,000 wintering tundra swans and snow geese that feed on agricultural fields within the refuge watershed.

Objective: Insure conditions for breeding and wintering waterfowl currently using the refuge are maintained.

Rationale for Objective: Waterfowl surveys have proven that the refuge provides significant nesting habitat for wood ducks and can support significant winter populations of swans and geese.

Strategies:

- Monitor and maintain existing marsh and bog restoration sites to support brood habitat for wood ducks.
- Monitor and manage public access to Lake Drummond to allow the area to be used by wintering tundra swans and snow geese.

Black Bear Management. *Off-site development may eventually create a genetically islocated black bear population.*
American Black Bear. Waverley Traylor.

Objective: Promote the protection and restoration of 7,000 acres of prior-converted farmland to maintain feeding habitat for wintering waterfowl.

Rationale for Objective: Development pressures threaten to convert much of the farmland along the refuge's eastern boundary to other uses; thus eliminating these feeding areas for wintering swans and geese.

Strategies:

- Support efforts by The Nature Conservancy, Virginia Department of Game and Inland Fisheries, and other organizations to protect farmlands that are used by waterfowl from development.
- Evaluate the need to expand the refuge acquisition boundary to acquire those farmlands where public ownership would enhance their protection and restoration for waterfowl habitat.

Program: Black Bear Management

Rationale for Program: The refuge contains one of the largest concentrations of black bears on the east coast of the United States. This large bear population, however, exists within an area that is surrounded by considerable commercial and residential development as well as major highways. The continued development of off-refuge lands has decreased the amount of bear habitat surrounding the refuge. Increased traffic along existing highways and highway improvements along the refuge perimeter may eliminate natural corridors through

which bears now traverse to other areas of habitat within the refuge watershed. These developments create nuisance bear issues, as bears visit residential areas, disrupt traffic, and increase crop depredation. Moreover, the off-refuge development may eventually result in a genetically isolated black bear population.

The continued loss of habitat and corridors outside the refuge may eventually create the need to maintain or reduce the black bear population to levels that can be safely supported solely by the refuge. Due to this concern, collaboration with biologists from the Virginia Department of Game and Inland Fisheries and the North Carolina Wildlife Resources Commission began in 1997 to assess the status of bear populations within the refuge watershed and determine the desirability to controlling the refuge bear population. These collaborations led to planning a two-day recreational hunt in late November or early December that would be conducted to assure no significant reduction of the bear population. This hunt would provide a wildlife-oriented recreational opportunity as well as provide the refuge with information on the physical parameters of the bear population. Thus, the refuge completed compatibility determinations and added "black bears" to the current big game hunting program on the refuge in 1998.

The black bear is symbolic, in the view of the public, of the wildlife associated with the Great Dismal Swamp NWR ecosystem. The habitat and large size of the refuge means that the refuge will likely always contain a large black bear population. Therefore, an expectation exists for the refuge to have significant stewardship responsibilities for this highly visible bear population.

Objective: Maintain a black bear population that is viable and within the carrying capacity of the refuge.

Strategies:

- Continue to monitor black bear populations in cooperation with the state wildlife agencies and research/educational institutions to provide adequate demographic data to guide habitat and bear population management decisions on the refuge.
- Provide sites for emergency relocations of black bears in partnership with state wildlife management agencies.
- Work with states to acquire data on bears harvested under crop depredation permits, bear hunting and road kills.
- In partnership with the states and non-governmental organizations, seek funding to conduct studies to compliment previous refuge bear research that focuses on the demography of black bears, their genetics, population size, growth and dispersal patterns.
- Cooperate with state wildlife management agencies in developing

and implementing emergency response to nuisance bears and enhancing educational outreach related to bears within the refuge watershed.

- Initiate limited recreational bear hunting on the refuge (See Goal 4 / Public Use/ Hunting Opportunities).

Goal 3: (Land Protection) **Provide protection of those areas within the Great Dismal Swamp NWR watershed that either are remnants of Great Dismal Swamp habitat or can be restored to Great Dismal Swamp habitat.**

Program: Habitat Protection and Restoration

Rationale for Program: In 1972, the Dismal Swamp Study Act (P.L. 92-478) directed the Secretary of the Interior to study the desirability and feasibility of protecting and preserving the Great Dismal Swamp and Dismal Swamp Canal. Initially, a 210,000-acre study area was delineated to be considered for protection and restoration, and the Secretary ultimately recommended that approximately 123,000 acres be acquired by state and federal agencies for protection and stewardship. Over the past three decades, much of the land that was excluded from recommended public ownership has been developed and converted to other uses. This loss of habitat poses serious adverse ramifications for the refuge and surrounding communities. First, the loss of wildlife corridors threaten to make the refuge an ecological isolate, thus threatening the health of wildlife populations and decreasing "societal carrying capacities" for some wildlife populations such as black bear. Second, the refuge has arguably become the largest urban wildlife refuge in the United States, as nearby development now supports a neighboring human population of 1.6 million people. This adjacent human population and development complicates the habitat restoration mission of the refuge, since ecosystem perpetuation will involve hydrologic restoration and aggressive fire management that could potentially affect refuge neighbors. Finally, the continued development of historic "Great Dismal Swamp" habitat threatens the quality of life for humans within the watershed through the development of flood-

prone areas where hydrologic disruption is significant, by a reduction of air and water quality, and by the loss of open space.

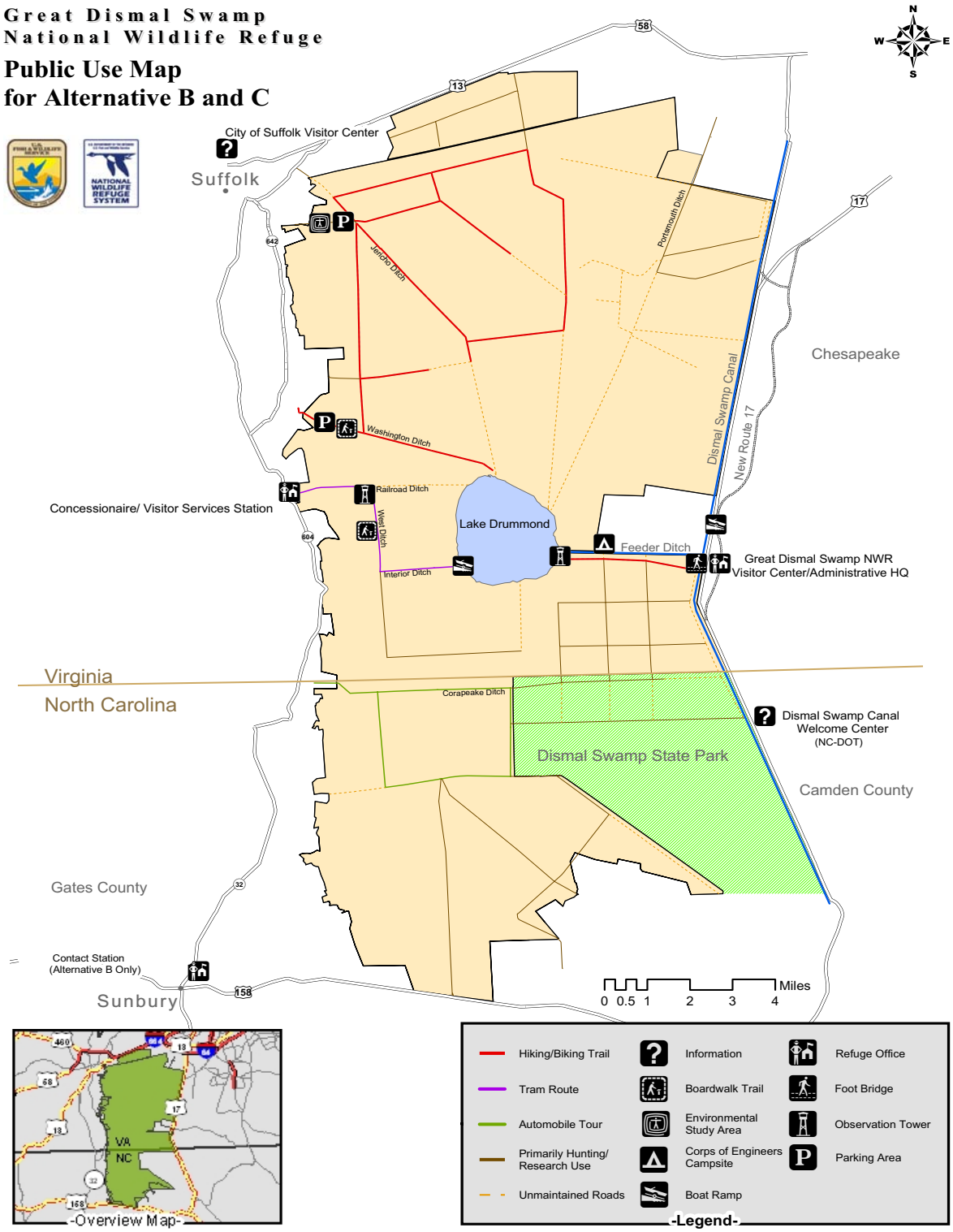
The protection and restoration of the remaining restorable habitats would mitigate trends of creating an ecologically isolated refuge and creating societal carry capacities for refuge wildlife populations, thus maintaining a higher quality of life for citizens in neighboring communities.

Objective: Pursue the protection and restoration of historic Great Dismal Swamp habitat within the refuge watershed, focusing on the area identified within the original 210,000 acre study area.

Strategies:

- Acquire the remaining properties within the current acquisition boundary when they are offered by willing sellers (approximately 4,000 acres).
- Cooperate and support efforts by neighboring cities and counties to restore and protect key remnants of restorable Great Dismal Swamp habitat outside the refuge acquisition boundary.
- Collaborate with and provide technical assistance to cities and counties when they are reviewing development proposals adjacent to the refuge and within the historic range of the Great Dismal Swamp.
- Promote the maintenance of key wildlife corridors by recommending appropriate wildlife passages be incorporated into highway designs.
- Partner with The Nature Conservancy, state wildlife agencies, and other non-government organizations to protect and restore seasonally flooded areas within the refuge watershed.
- Promote hydrologic restoration when opportunities develop (e.g. US Highway 158, Norfolk and Southern Railroad, Dismal Swamp Canal).
- Resolve boundary disputes, post the refuge boundary, and patrol/inspect the boundary to detect encroachment on the refuge and criminal activities.
- Cooperate and support protection of 7,000 acres of prior-converted farmland east of the refuge for the purpose of restoring early successional habitat for waterfowl and other wildlife management needs within the watershed.
- Cooperate and support protection of 15,000 acres of seasonally flooded forests south of US Highway 158 to expand habitat for neotropical migratory birds, red-cockaded woodpeckers, and black bears, as well as restore surface hydrology.

Figure 3-3


Great Dismal Swamp
National Wildlife Refuge
Public Use Map
for Alternative B and C
N
W
E
S
City of Suffolk Visitor Center
Suffolk
58
13
17
642
Jericho Ditch
Portsmouth Ditch
Chesapeake
Dismal Swamp Canal
New Route 17
Washington Ditch
Railroad Ditch
West Ditch
Interior Ditch
Concessionaire/ Visitor Services Station
604
Lake Drummond
Feeder Ditch
Great Dismal Swamp NWR
Visitor Center/Administrative HQ
Virginia
North Carolina
Corapeake Ditch
Dismal Swamp Canal
Welcome Center
(NC-DOT)
Dismal Swamp State Park
Camden County
Gates County
32
Contact Station
(Alternative B Only)
Sunbury
158
0 0.5 1 2 3 4
Miles
-Overview Map-
VA
NC
-Legend-
Hiking/Biking Trail
Tram Route
Automobile Tour
Primarily Hunting/
Research Use
Unmaintained Roads
Information
Boardwalk Trail
Environmental
Study Area
Corps of Engineers
Campsite
Boat Ramp
Refuge Office
Foot Bridge
Observation Tower
Parking Area

Goal 4: (Public Use) **Establish a public use program that will encourage awareness, understanding, appreciation and stewardship of the Great Dismal Swamp NWR ecosystem while complementing the refuge resource management objectives.**

In 2002, an estimated three-million people visited the Virginia Beach/ Hampton Roads area. Nearby Colonial Williamsburg, in Williamsburg, Virginia, sold over 929,000 admission tickets to visitors. Several million more visited the Outer Banks of North Carolina, located just to the southeast of the refuge. These areas represent just a few of the locations refuge visitors stay or report visiting when they visit the Great Dismal Swamp NWR.

In Alternative B, public use staff will grow to accommodate the increase in facilities and services. Some facilities will be open seven days a week. This expansion of services will increase the refuge's visibility as one of the area's premier tourist destinations. With the additional staff and facilities, the refuge and the Service's message will reach a wider, more diverse audience. At the same time, wildlife resources within the refuge will be protected through a focus of visitor experiences in specific locations.

Program: Hunting Opportunities

Rationale for Program: Hunting is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997. By providing wildlife-dependent recreational opportunities, like hunting, helps foster an appreciation for wildlife and a sense of stewardship for the environment.

There are limited public hunting opportunities in southeastern Virginia and northeastern North Carolina. By continuing to allow hunting on the refuge, additional hunting opportunities are provided to the surrounding community.

The refuge has been deer hunting on the refuge since 1979. In 1998 a

Figure 3-4.

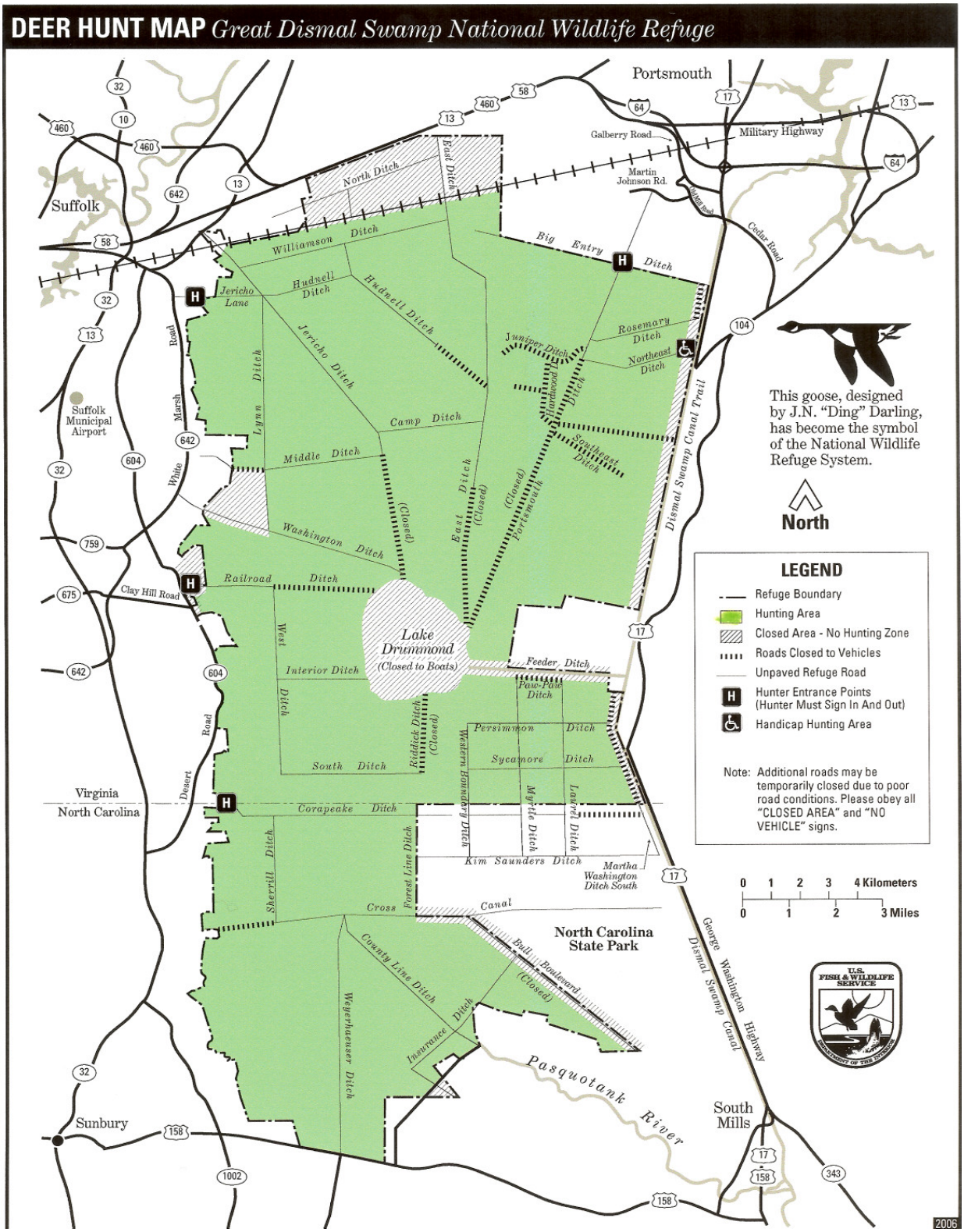
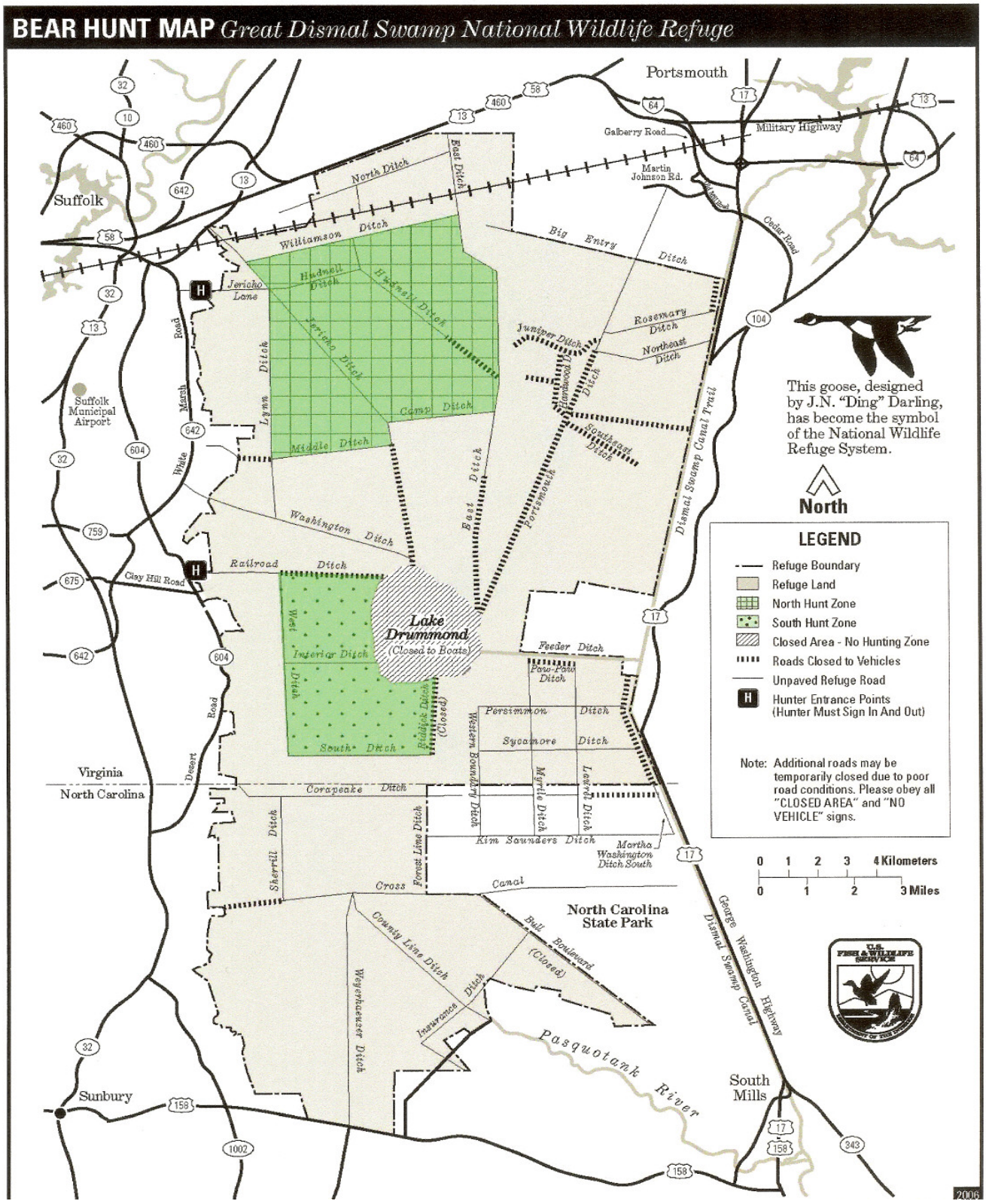

DEER HUNT MAP Great Dismal Swamp National Wildlife Refuge
Portsmouth
Suffolk
Galberry Road
Military Highway
Martin Johnson Rd.
Cedar Road
North Ditch
East Ditch
Williamson Ditch
Big Entry Ditch
Hudnell Ditch
Jericho Lane
Jericho Ditch
Juniper Ditch
Rosemary Ditch
Northeast Ditch
Hawthorn Ditch
Southeast Ditch
Camp Ditch
Middle Ditch
Lynn Ditch
Marsh Road
White Road
Suffolk Municipal Airport
East Ditch (Closed)
(Closed) Portsmouth
Dismal Swamp Canal Trail
Washington Ditch
Railroad Ditch
Clay Hill Road
Lake Drummond (Closed to Boats)
West Interior Ditch
Feeder Ditch
Paw-Paw Ditch
Persimmon Ditch
Sycamore Ditch
Riddick Ditch (Closed)
South Ditch
Western Boundary Ditch
Myrtle Ditch
Laurel Ditch
Desert Road
Virginia
North Carolina
Corapeake Ditch
Kim Saunders Ditch
Martha Washington Ditch South
Sherrill Ditch
Forest Line Ditch
Cross Canal
North Carolina State Park
George Washington Highway
Dismal Swamp Canal
County Line Ditch
Bull Boulevard (Closed)
Weyerhaeuser Ditch
Insurance Ditch
Pasquotank River
Sunbury
South Mills
This goose, designed by J.N. "Ding" Darling, has become the symbol of the National Wildlife Refuge System.
North
LEGEND
Refuge Boundary
Hunting Area
Closed Area - No Hunting Zone
Roads Closed to Vehicles
Unpaved Refuge Road
Hunter Entrance Points (Hunter Must Sign In And Out)
Handicap Hunting Area
Note: Additional roads may be temporarily closed due to poor road conditions. Please obey all "CLOSED AREA" and "NO VEHICLE" signs.
0 1 2 3 4 Kilometers
0 1 2 3 Miles
U.S. FISH & WILDLIFE SERVICE
2006

Figure 3-5.


BEAR HUNT MAP Great Dismal Swamp National Wildlife Refuge
Portsmouth
Suffolk
Galberry Road
Military Highway
Martin Johnson Rd.
Cedar Road
North Ditch
East Ditch
Williamson Ditch
Big Entry Ditch
Jericho Lane
Hudnell Ditch
Jericho Ditch
Juniper Ditch
Rosemary Ditch
Northeast Ditch
Lynn Ditch
Camp Ditch
Middle Ditch
Suffolk Municipal Airport
Washington Ditch
East Ditch
Portsmouth
Dismal Swamp Canal Trail
Railroad Ditch
Clay Hill Road
Lake Drummond
(Closed to Boats)
West Interior Ditch
South Ditch
Ridgdill Ditch (Closed)
Feeder Ditch
Persimmon Ditch
Sycamore Ditch
Western Boundary Ditch
Myrtle Ditch
Laurel Ditch
Kim Saunders Ditch
Martha Washington Ditch South
Virginia
North Carolina
Corapeake Ditch
Desert Road
Sherrill Ditch
Forest Line Ditch
Cross Canal
North Carolina State Park
County Line Ditch
Bull Boulevard (Closed)
Weyerhaeuser Ditch
Insurance Ditch
Pasquotank River
George Washington Highway
Dismal Swamp Canal
South Mills
Sunbury
This goose, designed by J.N. "Ding" Darling, has become the symbol of the National Wildlife Refuge System.
North
LEGEND
Refuge Boundary
Refuge Land
North Hunt Zone
South Hunt Zone
Closed Area - No Hunting Zone
Roads Closed to Vehicles
Unpaved Refuge Road
Hunter Entrance Points (Hunter Must Sign In And Out)
Note: Additional roads may be temporarily closed due to poor road conditions. Please obey all "CLOSED AREA" and "NO VEHICLE" signs.
0 1 2 3 4 Kilometers
0 1 2 3 Miles
2006

Compatibility Determination was completed and black bear hunting was added to the big game hunting program. This bear hunt has not yet been implemented. Our proposal is to implement this bear hunt as a component of this Alternative.

Objective: Provide a safe, quality big game hunt program and promote special hunting opportunities on the Great Dismal Swamp NWR.

Strategies:

- Provide an annual deer hunt program for archery and shotgun in designated areas of the Great Dismal Swamp NWR on designated days in October and November (see figure 3-4).
- Provide an annual black bear hunt program in designated areas of the Virginia portion of the Great Dismal Swamp NWR on designated days in November and December (see figure 3-5).
  - Bear hunting parameters may be adjusted annually based on changing conditions and data. The initial hunt will be administered within the following guidelines:
    1. Up to two entrances will be designated for the hunt, which will make up less than 25% of the potential hunting area of the refuge. A maximum of 100 permits will be issued.
    2. The hunt will be a maximum of two days.
    3. The harvest limit will be approximately 20 bears. If 10 or more bears are killed the first day, various parameters will be evaluated and the second hunt day may be cancelled.
    4. As with the deer hunt, no dogs will be used to hunt bears.
- Coordinate with special needs organizations to identify ways to provide better hunting access for people with disabilities.
- Host an annual hunter safety program at the refuge.
- Provide for youth hunting opportunities.

Boating and Fishing Access. *Boating and fishing on Lake Drummond is allowed year-round during daylight hours from the Feeder Ditch entrance. Lake Drummond. USFWS.*

Program: Boating and Fishing Access

Rationale for Program: Fishing is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

Fishing on Lake Drummond is allowed year-round during daylight hours when accessed via the Feeder Ditch on the east side of the refuge (10 horsepower limit). Utilizing a boat rental concessionaire, the Railroad Ditch entrance on the west side of the refuge would provide

year-round access for boating and fishing on both sides of the refuge. In addition to concessionaire rentals, a fishing permit will be available April 1 through June 15 to allow access for private fishing boats (25 horsepower limit) to enter Lake Drummond by the Interior boat ramp.

Objective: Provide access to Lake Drummond for fishing and boating year round.

Strategies:

- Lake Drummond is open for boating and fishing during daylight hours, access via Feeder Ditch, year round.
- Continue to provide a fishing season permit, for April 1 to June 15, to Lake Drummond, access via Interior Ditch Road, during daylight hours.
- Promote fishing in southeastern Virginia and northeastern North Carolina by partnering with local municipalities and other organizations for off-site fishing events.
- Recruit and contract a private company to maintain a fleet of canoes/kayaks for rent.
- Provide guided canoe/kayak interpretive tours through the concessionaire.

Program: Environmental Education

Rationale for Program: Environmental education is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

As our population increases, understanding its impact on the natural world is becoming increasingly more important for both our quality of life and our economy. More and more people are removed from the natural world in their daily lives and understand it less. In addition to those audiences served under current management, in this alternative, the focus will be expanded to include the southeastern Virginia and northeastern North Carolina region, reaching both rural, agricultural-based, and urban communities.

Whether it was early efforts to drain the swamp, the establishment of the Dismal Swamp Canal and canal life, or runaway slaves hiding in the swamp, the Great Dismal Swamp is deeply embedded in Virginia and North Carolina history. The swamp's ecosystem contributed greatly to the history of the region. Details of this cultural contribution will be a part of the refuge's educational programs along with the biological aspects of the ecosystem.

Objective: Provide a quality comprehensive environmental education program to the Hampton Roads and northeastern North Carolina region that incorporates the U.S. Fish & Wildlife Service message, the cultural and natural history of the Great Dismal Swamp , the impact of man on the environment, and the resource management practices used by the refuge staff to protect and preserve the Great Dismal Swamp NWR.

Strategies:

- Continue to offer teacher activity guides and refuge videos for the classroom.
- Outreach to teachers to encourage utilization of the refuge as an outdoor classroom.
- Provide field study equipment and field guides for loan to visiting school trips.
- Continue to participate in environmental education programs in schools.
- Partner with local universities and community colleges to develop and provide training on the Great Dismal Swamp NWR ecosystem utilizing refuge-specific teacher training for those school districts interested in providing professional development credits to their teachers.
- Purchase land and develop the Jericho Lane Education Pavilion.
- Develop other site-specific biological and historical educational media, utilizing the latest technology and in compliance with Virginia and North Carolina state academic standards.
- Present at local, regional, and national education conferences to encourage teachers to discover the Great Dismal Swamp NWR with their students.
- Establish partnerships with local elder-hostel programs.
- Develop and implement a Junior Naturalist program in the region.
- Establish a cooperating agreement with the region's school systems to provide specific environmental education programs which incorporate refuge-specific service learning activities.
- Establish a library and resource center for teachers and students.
- Utilize the latest technology to share the refuge environmental education program with those unable to visit.

Program: Interpretation

Rationale for Program: Interpretation is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

The Great Dismal Swamp is an integral part of the natural and cultural heritage of the region. The swamp's role in the timber industry from the 18th to the 20th century and its role in the Underground Railroad are well documented, not to mention the establishment of the Dismal Swamp Canal and canal life. The Hampton Roads/Virginia Beach/Outer Banks region swells with tourists every year. In 2002, Virginia Beach estimated over 3 million visitors to the area. Colonial Williamsburg, approximately one-hour north of the refuge, identified over 929,000 ticketed visitors and countless numbers of people who did not purchase a ticket.

The Outer Banks, in North Carolina, also receives millions of visitors every year. Many of these people either travel past the refuge on their way to Virginia Beach, Colonial Williamsburg or the Outer Banks, or seek out the refuge. According to the North Carolina Department of Transportation, over 16,000 vehicles each day pass through the intersection of US Highway 158 and Rt. 32 in Sunbury, North Carolina. The Dismal Swamp Canal Visitor Center located on US Highway 17 in North Carolina estimates their visitation from 400,000 – 600,000 each year since their opening in 1989. The Center is located on a four lane portion of the highway, but a dangerous two lane section just to the north in Virginia is currently being re-aligned and improved to four lanes. At the completion of the road project, a significant increase in vehicle volume is anticipated.

The refuge will establish a visitor facility on the newly re-aligned US Highway 17, a major access way to Virginia Beach, Hampton Roads and the Outer Banks, and will be incorporated into the Dismal Swamp Canal Recreational Trail being developed by the City of Chesapeake, Virginia. The environmentally-friendly designed facility will include interactive exhibits about the Great Dismal Swamp NWR and the ecology of the region. The facility will inspire visitors to get out onto the refuge. Through coordination with the Army Corps of Engineers to provide access across the Dismal Swamp Canal, the refuge will establish a 3-mile hiking trail along the Feeder Ditch to Lake Drummond. This will make ground access to the refuge from the eastern boundary possible, a new access route about which many people inquire.

Additional staff will provide more opportunities for both on-site and off-site personal interpretation. Interpretive experiences, including guided walks, special events and festivals, display panels, exhibits and other

programs will assist refuge visitors to become oriented to the trails of the refuge, and assist members of the community to understand the natural and cultural role of the swamp and man's impact on the environment.

Interpretive programming will be offered every weekend and include collaborative efforts with other museums and organizations. Gateway facilities (such as contact stations or kiosks), established along major transportation routes and near the "corners" of the refuge- Sunbury and Camden, North Carolina, and the cities of Suffolk and Chesapeake, Virginia, will provide further orientation to visitors traveling around the refuge and looking for the entrances to such a vast area. Program and refuge marketing will extend beyond the immediate boundaries and into Norfolk, Virginia Beach, and the Colonial Williamsburg/Jamestown areas in Virginia, and to Elizabeth City and the Outer Banks in North Carolina.

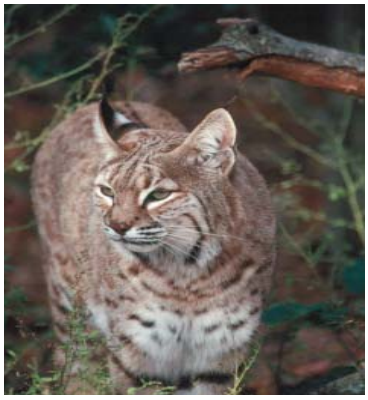
Objective: Provide quality interpretive experiences to the southeastern Virginia/northeastern North Carolina region, designed to increase awareness, understanding and support for the swamp's unique ecosystem and its role in the cultural landscape of the region and country, and the refuge's resource management practices.

Strategies:

- Produce and provide refuge publications on general refuge information and current issues.
- Provide year-round interpretive programs at several key locations around the refuge, in both North Carolina and Virginia.
- Expand natural history interpretation to include programs focused on resource management issues such as fire, Atlantic white cedar, red cockaded woodpeckers, bears and other urban conflicts of importance to the swamp ecosystem.
- Expand cultural history interpretation to include programs focused on the human impact on the swamp, timber and economic resources of the swamp, the Underground Railroad, and the Dismal Swamp Canal.
- Host annual events highlighting conservation celebrations such as International Migratory Bird Day, National Wildlife Refuge Week, National Public Lands Day and the Great Dismal Swamp NWR anniversaries.
- Update and maintain interpretive panels, boardwalks, and kiosks at Washington Ditch and Jericho Lane.
- Update and maintain interpretive panels and kiosks on Railroad/ West/Interior Trail and Feeder Ditch Trail.
- Develop and maintain kiosk at Dismal Swamp Canal Visitor Center (under NCDOT).

- Contract a concessionaire to provide interpretive boat tours on Lake Drummond.
- Partner with the City of Suffolk to develop Great Dismal Swamp NWR exhibits for their visitor center.
- Develop interpretive exhibits and programs for the US Highway 17 complex to serve both the refuge's North Carolina and Virginia communities and the visiting public.
- Develop interpretive exhibits for the Jericho Lane Pavilion.
- Develop and produce interpretive materials for handouts .
- Develop interpretive exhibits and programs for a contact station at Sunbury, North Carolina, to orient visitors traveling east toward Virginia Beach and the Outer Banks.

Program: Wildlife Observation and Photography



Wildlife Observation. *Refuge trails provide opportunities for visitors to view, photograph, and appreciate wildlife in the habitat. Bobcat. :Waverley Traylor.*

Rationale for Program: Wildlife observation and photography are two of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

The Great Dismal Swamp NWR is a wonderful place to observe and photograph wildlife; however, it is also very large which can provide an obstacle in getting to some of the more picturesque locations. The refuge will contract a concessionaire to provide interpretive boat and tram tours, and bicycle and boat rentals to refuge visitors allowing them easier access to the refuge. This access will be focused on specific trails to ensure limited wildlife and habitat impact.

An additional hiking trail will be developed along the Feeder Ditch leading to Lake Drummond. An interpretive auto tour route will be established along Corapeake/Sherrill/Cross/Forest Line Ditches to highlight the Atlantic white cedar and other forest-related refuge issues.

Objective: Provide opportunities for refuge visitors to view, photograph, and appreciate wildlife in the habitat as an effort to promote understanding of the impact of man's footprint on the fragile ecosystem of the Great Dismal Swamp NWR.

Strategies:

- Maintain Washington Ditch Trail and the Lake Drummond observation pier at Washington Ditch.
- Maintain approximately 50 miles of trails for foot or bike touring.
- Continue to provide access permits to nature-based tourism groups and outfitters, such as canoeing and kayaking, as well as local

municipalities, to promote wildlife observation.

- Contract a concessionaire to provide canoe/kayak and bicycle rentals and interpretive boat and tram tours, based at the Desert Road facility (with a satellite at the US Highway 17 visitor facility) using the Railroad/West/Interior Ditch access.
- Using environmentally friendly materials, pave public use access route Railroad/West/Interior and maintain boat ramp.
- Develop observation/photography platform at West/Railroad intersection.
- Develop observation deck and trail at old cypress area on West Ditch Road.
- Develop observation deck and trail at old cypress area on West Ditch Road.
- Coordinate with the Army Corps of Engineers to provide year-round water access of Lake Drummond via Feeder Ditch, to develop a foot-bridge system across the Dismal Swamp Canal to access the Feeder Ditch hiking trail, and to accommodate boat tours to Lake Drummond.
- Develop trail along Feeder Ditch to Lake Drummond.
- Develop observation tower on Feeder Ditch Trail overlooking Lake Drummond.
- Using environmentally friendly materials, establish a paved interpretive auto tour route along Corapeake, Sherrill, Cross and Forest Line Ditches to highlight the Atlantic white cedar and other forest-related refuge issues.
- Using environmentally friendly materials, pave public use access route from White Marsh Road to parking area on Washington Ditch Trail.
- Using environmentally friendly materials, pave public use access route from White Marsh Road to parking area on Jericho Lane.
- As additional visitor facilities are developed, general access for some trails will be restricted to research and hunting only.

Volunteers. *Volunteers staff Service exhibits at local festivals.* USFWS.

Program: Volunteers

Rationale for Program: In all programs volunteers are a valuable asset, bringing a unique element of local history and knowledge and, at times, providing technical assistance to refuge wildlife management activities.

Objective: Provide opportunities for people to donate their time and talents to the refuge, building community support and providing a financial savings to the Service.

Strategies:

- Identify volunteer opportunities and establish "job descriptions" for those opportunities.
- Distribute volunteer internship opportunities to colleges and universities nationally.
- Conduct two volunteer training workshops per year.
- Hold an annual volunteer recognition and appreciation event.
- Expand volunteer recruitment efforts to include local/regional/ national levels.
- Develop and implement a Junior Naturalist program to recruit new volunteers.
- Establish RV campsite pads with electric, water and sewer for 2-3 month term volunteers at Sunbury Refuge Operations Station.

Program: Outreach

Rationale for Program: The Williamsburg/ Hampton Roads/Outer Banks region is rapidly becoming a densely populated urban area. Its residential population is experiencing some of the most dramatic rates of growth in Virginia. In addition to the services offered at the current level, it is critical that the refuge reach beyond its immediate borders to educate the region on the Great Dismal Swamp NWR ecosystem and on how the activities around the refuge affect the health of the swamp and, in effect, the health of the surrounding communities.

Objective: Coordinate with Virginia and North Carolina state and local partners to participate in community events and provide input on local environmental issues.

Strategies:

- Continue to serve as advisors in regional government conservation planning.
- Continue to work with conservation groups, such as The Nature Conservancy and the Izaak Walton League of America to partner in finding solutions to area environmental issues.
- Continue to share refuge facilities (e.g. conference room at the refuge headquarters) with state and local agencies.
- Offer off-site outreach programs, by request and as staff schedules permit, to local civic and environmental organizations with special emphasis on providing various audiences information about refuge management issues, including forest management, fire management, bear management, and protection of trust resources.

Facilities for Visitor Services

Rationale for Program: Public demand for improved visitor services was unquestionably the dominant issue presented at the public scoping meetings in January, 2002. Moreover, the establishing legislation for the refuge supported the concept of developing a visitor friendly refuge for wildlife-oriented educational and recreational activities. This concept was further corroborated and supported by the "Public Use Development Plan - Great Dismal Swamp National Wildlife Refuge" that was published by the U.S. Fish and Wildlife Service in 1979. Therefore, the vision that calls for developing major facilities for visitor services addresses a public demand, fulfills the legislated direction for the refuge, supports a long-standing agency position, and would enhance visibility and support for the Great Dismal Swamp National Wildlife Refuge and the National Wildlife Refuge System.

Considering the large size of the refuge and the traveling time required just to traverse the perimeter of the boundary, two locations would be needed for developing adequate visitor service centers. In Suffolk, the present site of the refuge headquarters provides an ideal location to establish a Visitor Service Station to support a variety of concessionaire-operated activities, refuge outreach, and distribution of trail and refuge information. The building, now too small to meet all staffing needs, is of adequate size to allow appropriate alterations to accommodate considerable increases in visitation. In addition, the headquarters is adjacent to the Railroad Ditch Entrance, making it possible to connect this visitor service complex directly to Railroad Ditch Road, providing a safe route for public transportation to Lake Drummond. This direct road linkage would considerably improve the safety of public access to this area, as the present Railroad Ditch Entrance is located in a blind curve on Desert Road. The conversion of the present administrative headquarters facility would create the need to move staff functions to make room for the visitor services. All other staff functions would be distributed appropriately between the administrative headquarters/ Visitor Center Complex on US Highway 17 in Chesapeake, the Field Operations Center at 3216 Desert Road in Suffolk, and the Refuge Contact Station in Sunbury.

Forest Management.
Access provided for educational and research interests in other habitats.
Determining GPS reading for old growth cypress. USFWS.

In Chesapeake, the realignment and expansion of US Highway 17 has created an ideal location for a Refuge Visitor Center Complex. Again, this site was previously identified for the same use in the Refuge's 1979 Public Use Plan. The new highway alignment provides an area of approximately 250 acres between the highway and the Dismal Swamp Canal where interpretive and educational facilities would be constructed.

Adjacent to this major highway, this location can easily support the attraction of 500,000+ visitors annually. Moreover, considerable public interest exists in providing broader educational opportunities to develop partnerships with the City of Chesapeake, Virginia Department of Game and Inland Fisheries, The Nature Conservancy, Tidewater Community College, Old Dominion University, and other educational and conservation interest.

Most remaining staff, including those directly related to Operations functions, would be stationed at the Field Operations Center at 3216 Desert Road in Suffolk. Centrally located on the western flank of the refuge, this site would be most convenient for field activities considering most roads to the interior of the refuge access from the west.

The Sunbury Contact Center would house a small group of staff and provide an opportunity to establish a point of contact to serve refuge interest in North Carolina. The physical presence of staff in this area would improve communications, distribution of public information, and foster support for the refuge mission in this area where resource management issues will intensify over the next twenty years. In addition, the proposed site has a substantial and a relatively new sewage treatment system that should be able to accommodate the addition of RV hookups for volunteer housing.

To conclude, this overall development concept places visitor services, logistical operations, and administrative services at locations that would best serve the needs of the refuge. Also important is that this approach reduces the impact of development on the existing refuge land. Most of the development would occur on land already developed for refuge operations (Suffolk), lands procured primarily for administrative/visitor operations (Chesapeake), or moved to existing developments (Sunbury).

Objective: Develop administrative, operational, and visitor facilities to serve as hubs for visitor access to the refuge and administrative/ operational support.

Strategies:

- Develop the administrative headquarters/Visitor Center Complex on US Highway 17 in Chesapeake, Virginia.
- Convert the existing refuge headquarters in Suffolk, Virginia, to a Visitor Service Station to support concessionaire operations and serve as a visitor services station.
- Establish a Refuge Contact Station in Sunbury, North Carolina.

Alternative C: Limited Habitat Management

Management Focus: This alternative retains most of the expansion of visitor services described within the Service's Preferred Alternative but limits habitat manipulation to those activities that qualify under existing fire management programs. Thus, habitat manipulation will be limited primarily to fuels reduction, utilizing select timber cutting and prescribed burning.

Rationale: The Great Dismal Swamp NWR incorporates arguably the best remaining remnant of seasonally-flooded habitat that once dominated southeastern Virginia and northeastern North Carolina. Yet, humans have altered even the refuge habitat substantially over the past two centuries. Resource management specialists generally believe that natural habitat diversity and wildlife have suffered as a result. Nevertheless, the public does not universally accept habitat restoration that requires significant manipulation. While refuge management firmly believes that the preponderance of scientific knowledge favors progressive habitat restoration described in the preferred alternative, this option acknowledges an alternative habitat vision for the refuge.

Goal 1: (Habitat) Manage the area for the primary purpose of protecting and preserving a unique and outstanding ecosystem, as well as protecting and perpetuating the diversity of animal and plant life therein.

Program: Forest Management

Rationale for Program: "A timber management program to include the continuing harvest of select timber species under controlled

conditions" is one of the primary objectives of the refuge (USDI 1974). Forest management programs are directed towards restoring and enhancing the natural habitat diversity of the refuge by restoring or mimicking natural forces that once maintained habitat and wildlife diversity of the refuge.

The refuge's establishing legislation and supporting documents implies the refuge should pursue a direction that includes habitat manipulation. Nevertheless, a line of thought exists that continued human intervention with the natural forces should be modest for several reasons. Habitat management operations can temporarily disrupt visitor access to the refuge. Prescribed burning and commercial harvest of forests can be temporarily disruptive of the aesthetics of the refuge. Prescribed fires risk disrupting off-refuge human activities and property if fires escape the refuge or smoke drifts to highways, airports, and other populated areas.

Fire Management. *Fire detection/suppression operations reduce the probability of long-lasting catastrophic wildfies. Ground fire suppression.USFWS.*

Under this alternative, habitat manipulation will be restricted to hazard reduction prescribed burning that supports basic stewardship requirements related to legal, political, and societal mandates. Habitat manipulation for other purposes will be eliminated.

Objective: Habitat manipulation will be used for research and hazard fuel reduction prescribed fires only.

Strategies:

- Provide access to research and research interests for Atlantic white cedar forest areas.
- Prescribed fires will be restricted to the reduction of fuel accumulations for pine/pocosin areas.
- Provide access to educational and research interests in other habitats.

Program: Hydrologic Management

Rationale for Program: The 150 miles of ditches constructed since 1760 have created a drier forested wetlands system, resulting in significant ecological changes. Reversing this drying trend by slowing the rate of drainage supports the refuge mission of "protecting and perpetuating" the ecosystem. These efforts support refuge operations to implement prescribed burning, reduce the probability of ground fires and catastrophic wildfires, and improve brood habitat for wood ducks. Moreover, Congress recognized the importance of conserving water for

the proper stewardship of the Great Dismal Swamp by directing in the refuge's establishing legislation that the operation of the Dismal Swamp Canal could not adversely affect the refuge.

Objective: Maintain and/or restore hydrologic conditions to sustain or improve viability of wetland communities and their associated wildlife species.

Rationale for Objective: Water conservation and manipulation is required to support the ecosystem restoration mission. Restoring seasonal flooding of forests supports nesting and brood habitat for migratory waterfowl (e.g. wood ducks). Monitoring surface flooding conditions to assure that conditions are favorable to ground foraging neotropical migratory birds supports refuge and agency objectives. Maintaining higher ground water levels within Atlantic white cedar forest supports maintenance of this rare habitat. Continued maintenance and operation of the existing water control structures maintains a major capital investment in the refuge.

Strategies:

- Conserve water to restore natural hydrologic conditions within areas where cypress, maple, and gum are the dominant habitats.
- Monitor surface flooding conditions to assure that abnormal surface flooding does not interfere with ground-foraging neotropical migratory birds.
- Maintain ground-water levels within one foot of the surface within Atlantic white cedar stands.

Objective: Maintain and operate water control structures to support flood control and fire management operations.

Rationale for Objective: Water handling and conservation capabilities support flood control and prescribed fire and fire suppression operations.

Strategies:

- Adjust water control structures as needed to inhibit flood damage to refuge roads.
- Promote research and survey partnerships with research institutions, Corps of Engineers, and other government organizations to improve basic knowledge and interpretation of the refuge watershed.
- Cooperate with adjacent landowners along the Pasquotank River to allow proper operation and maintenance of the Newland flood-control dike.
- Assure that refuge water conservation measures not result in

flooding of adjacent neighboring private property.
- Continue current cooperative arrangement with the Corps of Engineers in which water release from Lake Drummond ceases at 15.75 MSL.
- Maintain water levels in ditches to support fire suppression and prescribed fire needs.

Program: Fire Management

Rationale for Program: Fire is known to have been an important natural force in maintaining natural habitat diversity within the refuge ecosystem. Fires that were ignited by humans and lightning created clearings that allowed different species of plants to flourish and maintained forest stands of varying ages. Fires also created depressions in the organic soils that evolved into marshes, bogs, and lakes.

Fire suppression in areas dominated by organic soils is labor-intensive and can require highly specialized equipment that state and local agencies do not maintain. Therefore, the refuge will need to maintain sufficient detection and suppression capabilities to provide initial attack on refuge wildfires in order to minimize risks to adjacent private property and human health.

Fire detection/suppression operations reduce the probability of long-lasting catastrophic wildfires that would threaten human health and property surrounding the refuge. Major highways, three airports, and considerable residential and commercial properties would be threatened if fires escaped from the refuge. Lightning from summer thunderstorms ignites most refuge wildfires, so most wildfires occur when surface and ground water conditions are favorable for ground fires of long duration. Long-lasting peat fires have been known to emit smoke for months and reduce air quality for lengthy periods. Early detection/suppression of fires reduces the chances of large fires developing; thus, reducing suppression time and expenses.

Objective: Maintain existing capabilities to detect and suppress wildfires.

Strategies:
- Maintain fire suppression capabilities necessary to complement the abilities of state and local fire suppression forces to contain and suppress wildfires within the refuge.

Goal 2: (Trust Resources/ Wildlife Species) Protect and enhance Service trust resources and other significant species.

Program: Red-cockaded Woodpecker Reintroduction

Rationale for Program: The red-cockaded woodpecker is listed as "endangered" on the Federal endangered species list. This species is known to have once existed within mature pine forests within the refuge, and small colonies have been discovered in southeastern Virginia and northeastern North Carolina. The woodpecker favors mature pine forest with relatively open understory maintained by frequent fires.

Woodpecker biologist have determined that the refuge's pine forest hold considerable potential for red-cockaded woodpecker foraging and nesting habitat and the refuge has been identified as a possible RCW recovery site. Habitat management required for the recovery effort will support the basic refuge mission of ecosystem restoration and enhancement.

Approximately 2,000 acres of pine/pocosin habitat within the refuge along the Virginia/North Carolina border have been identified as potential woodpecker habitat. Moreover, this area will likely qualify for funding to reduce fuel accumulations under the Wildlands Urban Interface or other fire management programs. A combination of mechanical clearing and prescribed burning will be required to restore and maintain this habitat. This portion of the refuge has an adequate road and ditch system to support equipment access and water transport capabilities in support of the habitat restoration operations.

Black Bear Management. *Enhance interpretive and educational outreach on the bear population within the refuge watershed. American Back Bear. Waverley Traylor.*

Objective: Re-introduce a viable population of red-cockaded woodpeckers into appropriate refuge habitat.

Strategies:

- Implement mechanical clearing and prescribed burning to restore habitat in the designated area of approximately 2000 acres appropriate for red-cockaded woodpeckers.
- Translocate red-cockaded woodpeckers from suitable donor population into designated area of the refuge.
- Promote the Safe Harbor program to engage private landowners in recovery efforts.

- Install artificial nesting cavities to support woodpecker nesting.

Program: Neotropical Migratory Birds

Habitat Protection and Restoration. *Promote hydrologic restoration when opportunities develop (e.g. US Highway 158, Norfolk and Southern Railroad, Dismal Swamp Canal). US Hwy 158. USFWS.*

Rationale for Program: The large blocks of contiguous forests attract nearly 100 species of neotropical migratory birds to seasonally inhabit the refuge, and nearly 70 species to nest within the refuge. Atlantic coast populations of neotropical migrants are generally declining due to the loss of habitat. The refuge, however, is one of the few areas where populations are stable.

The large populations and number of species of neotropical migratory birds make the refuge an ideal location to support long-term monitoring and studies of these species. Neotropical banding has been ongoing for decades within the refuge, and the Smithsonian Institution has been tracking nesting activities for neotropical migrants, particularly the Swainson's warbler, since 1990. These surveys provide some indications on the status of neotropical migrants within the refuge as well as the mid-Atlantic region of the United States. In addition, these surveys provide feedback that can be useful in adjusting refuge habitat management operations to support neotropical migratory birds.

Objective: Provide basic monitoring and survey support for neotropical migratory bird populations to regularly assess status of refuge populations.

Strategies:

- Develop and support partnerships with the Smithsonian Institution, state wildlife agencies, Natural Heritage programs, and other research institutions to monitor neotropical migrant populations and habitat preferences.
- Support banding partnerships for neotropical migrants.
- Adjust water management and other refuge habitat management operations to enhance habitat for neotropical migrants.

Program: Waterfowl Management

Rationale for Program: The large blocks of seasonally flooded forest provide natural cavities for wood duck nesting. Remnant marshes and bogs as well as the man-made ditches provide brood habitat for wood

ducks. Lake Drummond provides resting habitat for estimated peak populations of 10,000-15,000 wintering tundra swans and snow geese that feed on agricultural fields within the refuge watershed.

Waterfowl surveys have proven that the refuge provides significant nesting habitat for wood ducks and can support significant winter populations of swans and geese.

Objective: Insure conditions for breeding and wintering waterfowl currently using the refuge are maintained.

Strategies:

- Monitor and maintain existing marsh and bog restoration sites to support brood habitat for wood ducks.
- Monitor and manage public access to Lake Drummond to allow the area to be used by wintering tundra swans and snow geese.

Program: Black Bear Management

Rationale for Program: The refuge contains one of the largest concentrations of black bears on the east coast of the United States. This large bear population, however, exists within an area that is surrounded by considerable commercial and residential development as well as major highways. The continued development of off-refuge lands has decreased the amount of bear habitat surrounding the refuge. Increased traffic along existing highways and highway improvements along the refuge perimeter may eliminate natural corridors through which bears now traverse to other areas of habitat within the refuge watershed. These developments create nuisance bear issues, as bears visit residential areas, disrupt traffic, and increase crop depredation. Moreover, the off-refuge development may eventually result in a genetically isolated black bear population.

The black bear is symbolic, in the view of the public, of the wildlife associated with the Great Dismal Swamp NWR ecosystem. The habitat and large size of the refuge means that the refuge will likely always contain a large black bear population. Therefore, an expectation exists for the refuge to have significant stewardship responsibilities for this highly visible bear population.

Objective: Maintain a black bear population that is viable and within the carrying capacity of the refuge.

Strategies:

- Continue to monitor black bear populations in cooperation with the state wildlife agencies and research/educational institutions to provide adequate demographic data to guide habitat and bear population management decisions on the refuge.
- Provide sites for emergency relocations of black bears in partnership with state wildlife management agencies.
- Work with states to acquire data on bears harvested under crop depredation permits, bear hunting and road kills.
- In partnership with the states and non-governmental organizations, seek funding to conduct studies to compliment previous refuge bear research that focuses on the demography of black bears, their genetics, population size, growth and dispersal patterns.
- Cooperate with state wildlife management agencies in developing and implementing emergency response to nuisance bears and enhancing educational outreach related to bears within the refuge watershed.

Goal 3: (Land Protection)

Provide protection of those areas within the Great Dismal Swamp watershed that either are remnants of Dismal Swamp habitat or can be restored to Dismal Swamp habitat.

Program: Habitat Protection and Restoration

Rationale for Program: In 1972, the Dismal Swamp Study Act (P.L. 92-478) directed the Secretary of the Interior to study the desirability and feasibility of protecting and preserving the Great Dismal Swamp and Dismal Swamp Canal. Initially, a 210,000-acre study area was delineated to be considered for protection and restoration, and the Secretary ultimately recommended that approximately 123,000 acres be acquired by state and federal agencies for protection and stewardship. Over the past three decades, much of the land that was excluded from recommended public ownership has been developed and converted to other uses. This loss of habitat poses serious adverse ramifications for the refuge and surrounding communities. First, the loss of wildlife corridors threaten to make the refuge an ecological isolate, thus threatening the health of wildlife populations and decreasing "societal

carrying capacities" for some wildlife populations such as black bear. Second, the refuge has arguably become the largest urban wildlife refuge in the United States, as nearby development now supports neighboring human population of 1.5 million people. This adjacent human population and development complicates the habitat restoration mission of the refuge, since ecosystem perpetuation will involve hydrologic restoration and aggressive fire management that could potentially affect refuge neighbors. Finally, the continued development of historic "Great Dismal Swamp" habitat threatens the quality of life for humans within the watershed through the development of flood-prone areas where hydrologic disruption is significant, by a reduction of air and water quality, and by the loss of open space.

The protection and restoration of the remaining restorable habitats would mitigate trends of creating an ecologically isolated refuge and creating societal carry capacities for refuge wildlife populations, thus maintaining a higher quality of life for citizens in neighboring communities.

Objective: Pursue the protection and restoration of historic Great Dismal Swamp habitat within the refuge watershed, focusing on the area identified within the original 210,000 acre study area.

Strategies:

- Acquire the remaining properties within the current acquisition boundary when they are offered by willing sellers (approximately 4,000 acres).
- Cooperate and support efforts by neighboring cities and counties to restore and protect key remnants of restorable Great Dismal Swamp habitat outside the refuge acquisition boundary.
- Collaborate with and provide technical assistance to cities and counties when they are reviewing development proposals adjacent the refuge and within the historic range of the Great Dismal Swamp.
- Promote the maintenance of key wildlife corridors by recommending appropriate wildlife passages be incorporated into highway designs.
- Partner with The Nature Conservancy, state wildlife agencies, and other non-government organizations to protect and restore seasonally flooded areas within the refuge watershed.
- Promote hydrologic restoration when opportunities develop (e.g. US Highway 158, Norfolk and Southern Railroad, Dismal Swamp Canal).
- Resolve boundary disputes, post refuge boundary.

Goal 4: (Public Use) **Establish a public use program that will encourage awareness, understanding, appreciation and stewardship of the Great Dismal Swamp ecosystem while complementing the refuge resource management objectives.**

Program: Hunting Opportunities

Rationale for Program: Hunting is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997. Providing wildlife-dependent recreational opportunities, like hunting, helps to foster an appreciation for wildlife and a sense of stewardship for the environment.

There are limited public hunting opportunities in southeastern Virginia and northeastern North Carolina. By opening the refuge to hunting, we provide the surrounding communities additional hunting opportunities, particularly to those who do not have access to private lands.

Objective: Provide a safe, quality hunt program and promote special hunt opportunities on the Great Dismal Swamp NWR.

Strategies:

- Provide an annual deer hunt program for archery and shotgun in designated zones of the Great Dismal Swamp NWR during specific days in October and November (13 day shotgun and archery concurrently in October and November).
- Coordinate with special needs organizations to identify ways to provide better hunting access for people with disabilities.
- Establish an annual hunter safety program at the refuge which will include map and compass orienteering.
- Provide for youth hunting opportunities.

Program: Boating and Fishing Access

Rationale for Program: Fishing is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

Fishing on Lake Drummond is allowed year-round during daylight hours when accessed via the Feeder Ditch on the east side of the refuge (10 horsepower limit). Utilizing a boat rental concessionaire, the Railroad Ditch entrance on the west side of the refuge would provide year-round access for boating and fishing on both sides of the refuge. In addition to concessionaire rentals, a fishing permit will be available April 1 through June 15 to allow access for private fishing boats (25 horsepower limit) to enter Lake Drummond by the Interior boat ramp.

Objective: Provide access to Lake Drummond for fishing and boating year round.

Strategies:

- Lake Drummond is open for boating and fishing during daylight hours, access via Feeder Ditch, year round.
- Continue to provide a fishing/boating season permit, for April 1 to June 15, to Lake Drummond, access via Interior Ditch Road, during daylight hours.
- Promote fishing in southeastern Virginia and northeastern North Carolina by partnering with local municipalities and other organizations for off-site fishing events.
- Recruit and contract a private company to maintain a fleet of canoes/kayaks for rent.
- Provide guided canoe/kayak interpretive tours through the concessionaire.

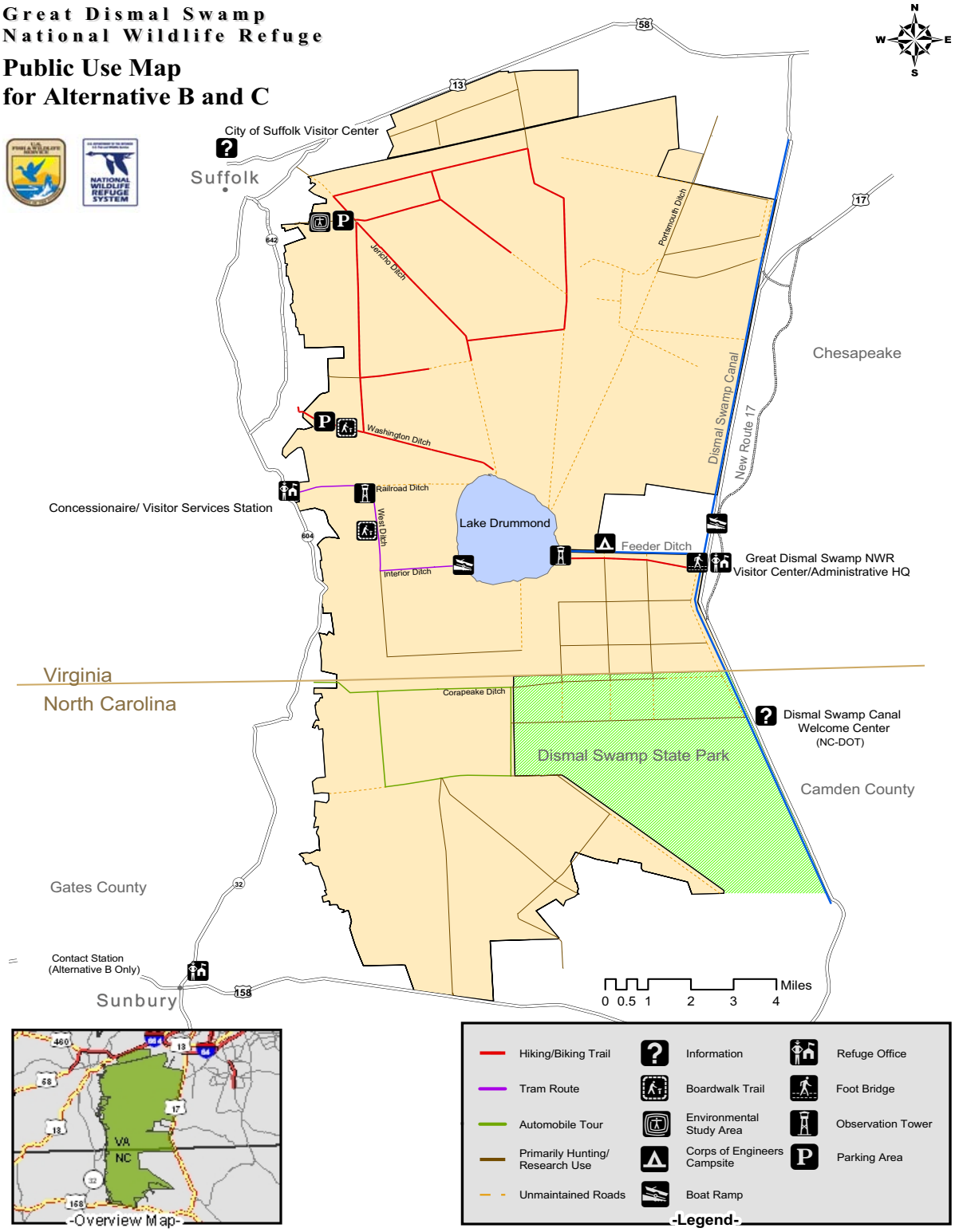
Program: Environmental Education

Rationale for Program: Environmental education is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

As our population increases, understanding its impact on the natural world is becoming increasingly more important for both our quality of life and our economy. More and more people are removed from the natural world in their daily lives and understand it less. In addition to those audiences served under current management, in this alternative, the focus will be expanded to include the southeastern Virginia and northeastern North Carolina region, reaching both rural, agricultural-based and urban communities.

Whether it was early efforts to drain the swamp, the establishment of the Dismal Swamp Canal and canal life, or runaway slaves hiding in the swamp, the Great Dismal Swamp is deeply embedded in Virginia and North Carolina history. The swamp's ecosystem contributed greatly

Figure 3-6.


Great Dismal Swamp
National Wildlife Refuge
Public Use Map
for Alternative B and C
City of Suffolk Visitor Center
Suffolk
Jericho Ditch
Portsmouth Ditch
Chesapeake
Dismal Swamp Canal
New Route 17
Washington Ditch
Railroad Ditch
West Ditch
Interior Ditch
Concessionaire/ Visitor Services Station
Lake Drummond
Feeder Ditch
Great Dismal Swamp NWR
Visitor Center/Administrative HQ
Virginia
North Carolina
Corapeake Ditch
Dismal Swamp Canal
Welcome Center
(NC-DOT)
Dismal Swamp State Park
Camden County
Gates County
Contact Station
(Alternative B Only)
Sunbury
Miles
0 0.5 1 2 3 4
-Overview Map-
VA
NC
Hiking/Biking Trail
Tram Route
Automobile Tour
Primarily Hunting/
Research Use
Unmaintained Roads
Information
Boardwalk Trail
Environmental
Study Area
Corps of Engineers
Campsite
Boat Ramp
Refuge Office
Foot Bridge
Observation Tower
Parking Area
-Legend-

to the history of the region. Details of this cultural contribution will be a part of the refuge's educational programs along with the biological aspects of the ecosystem.

Objective: Provide a quality comprehensive environmental education program to Hampton Roads and northeastern North Carolina region that incorporates the U.S. Fish & Wildlife Service message, the cultural and natural history of the Great Dismal Swamp NWR, the impact of man on the environment, and the resource management practices used by the refuge staff to protect and preserve the Great Dismal Swamp NWR.

Strategies:

- Continue to offer teacher activity guides and refuge videos for the classroom.
- Outreach to teachers to encourage utilization of the refuge as an outdoor classroom.
- Provide field study equipment and field guides for loan to visiting school trips.
- Continue to participate in occasional environmental education programs at various schools.
- Partner with local universities and community colleges to develop and provide teacher training on the Great Dismal Swamp NWR ecosystem utilizing environmental education materials.
- Purchase land and develop the Jericho Lane Education Pavilion.
- Develop other site specific biological and historical educational media, utilizing the latest technology and in compliance with Virginia and North Carolina state academic standards.
- Present at local, regional, and national education conferences to encourage teachers to discover the Great Dismal Swamp NWR with their students.
- Establish partnerships with local elder-hostel programs.
- Develop and implement a Junior Naturalist program in the region.
- Establish a cooperating agreement with the region's school systems to provide specific environmental education programs which incorporate refuge-specific service learning activities.
- Establish a library and resource center for teachers and students.
- Utilize the latest technology to share the refuge enviromental education program with those unable to visit.

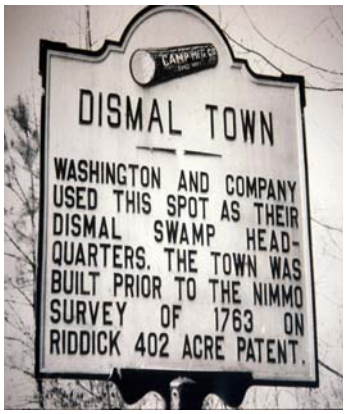
Program: Interpretation

Rationale for Program: Interpretation is one of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

The Great Dismal Swamp NWR is an integral part of the natural and cultural heritage of the region. The swamp's role in the timber industry from the 18th to the 20th century and its role in the Underground Railroad are well documented, not to mention the establishment of the Dismal Swamp Canal and canal life.

The Williamsburg/Hampton Roads/Outer Banks region swells with tourists every year. In 2002, Virginia Beach estimated over 3 million visitors to the area. Colonial Williamsburg, approximately one-hour north of the refuge, identified over 929,000 ticketed visitors and countless numbers of people who did not purchase a ticket. The Outer Banks, in North Carolina, also receives millions of visitors every year.

Many of these people either travel past the refuge on their way to Virginia Beach, Colonial Williamsburg or the Outer Banks, or seek out the refuge. According to the North Carolina Department of Transportation, over 16,000 vehicles each day pass through the intersection of US Highway 158 and Rt. 32 in Sunbury, North Carolina. The Dismal Swamp Canal Visitor Center located on US Highway 17 in North Carolina estimates their visitation from 400,000 – 600,000 each year since their opening in 1989. The Center is located on a four lane portion of the highway, but a dangerous two lane section just to the north in Virginia is currently being re-aligned and improved to four lanes. At the completion of the road project, a significant increase in vehicle volumn is anticipated.



Interpretation. *Cultural history interpretation to include programs focused on human impact on the swamp.*
Dismal Town marker, Washington Ditch Trail. USFWS.

The refuge will establish a visitor facility on the newly re-aligned US Highway 17, a major access way to Virginia Beach, Hampton Roads and the Outer Banks, and will be incorporated into the Dismal Swamp Canal Recreational Trail being developed by the City of Chesapeake, Virginia. The enviromentally-friendly designed facility will include interactive exhibits about the Great Dismal Swamp NWR and the ecology of the region. The facility will inspire visitors to get out onto the refuge. Through coordination with the Army Corps of Engineers to provide access across the Dismal Swamp Canal, the refuge will establish a 3-mile hiking trail along the Feeder Ditch to Lake Drummond. This will make ground access to the refuge from the eastern boundary possible, a new access route about which many people inquire.

Additional staff will provide more opportunities for both on-site and off-site personal interpretation. Interpretive experiences, including guided walks, special events and festivals, display panels, exhibits and other programs will assist refuge visitors to become oriented to the trails on the refuge, and assist members of the community to understand the natural and cultural role of the swamp and man's impact on the environment.

Interpretive programming will be offered every weekend and include collaborative efforts with other museums and organizations. Gateway facilities (such as contact stations or kiosks), established along major transportation routes and near the "corners" of the refuge- Sunbury and Camden, North Carolina, and the cities of Suffolk and Chesapeake, Virginia, will provide further orientation to visitors traveling around the refuge and looking for the entrances to such a vast area. Program and refuge marketing will extend beyond the immediate boundaries and into Norfolk, Virginia Beach, and the Colonial Williamsburg/Jamestown areas in Virginia, and to Elizabeth City and the Outer Banks in North Carolina.

Objective: Provide quality interpretive experiences to the southeastern Virginia/ northeastern North Carolina region, designed to increase awareness, understanding and support for the swamp's unique ecosystem and its role in the cultural landscape of the region and country, and the refuge's resource management practices.

Strategies:

- Produce and provide refuge publications on general refuge information and current issues.
- Provide year-round interpretive programs at several key locations around the refuge, in both North Carolina and Virginia.
- Expand natural history interpretation to include programs focused on resource management issues such as fire, Atlantic white cedar, red cockaded woodpeckers, bears and other urban conflicts of importance to the swamp ecosystem.
- Expand cultural history interpretation to include programs focused on human impact on the swamp, timber and economic resources of the swamp, the Underground Railroad, and the Dismal Swamp Canal.
- Host annual events highlighting conservation celebrations such as International Migratory Bird Day, National Wildlife Refuge Week, National Public Lands Day and the Great Dismal Swamp NWR anniversaries.
- Update and maintain interpretive panels, boardwalks, and kiosks at Washington Ditch and Jericho Lane.
- Update and maintain interpretive panels and kiosks on Railroad/ West/Interior Trail and Feeder Ditch Trail.
- Develop and maintain kiosk at Dismal Swamp Canal Visitor Center (NCDOT).
- Contract a concessionaire to provide interpretive boat tours on Lake Drummond.
- Partner with the City of Suffolk to develop Great Dismal Swamp NWR exhibits for their visitor center.
- Develop interpretive exhibits and programs for the US Highway 17 facility to serve both the refuge's North Carolina and Virginia communities and the visiting public.

- Develop interpretive exhibits for the Jericho Lane Pavilion.
- Develop and produce interpretive materials for handouts.

Program: Wildlife Observation and Photography

Rationale for Program: Wildlife observation and photography are two of the six priority wildlife-dependent recreational uses of the National Wildlife Refuge System, as stipulated in the Refuge Improvement Act of 1997.

The Great Dismal Swamp NWR is a wonderful place to observe and photograph wildlife; however, it is also very large which can provide an obstacle in getting to some of the more picturesque locations. The refuge will contract a concessionaire to provide interpretive boat and tram tours, and bicycle and boat rentals to refuge visitors allowing them easier access to the refuge. This access will be focused on specific trails to ensure limited wildlife and habitat impact.

Wildlife Observation. *Refuge trails provide opportunities for visitors to view, photograph, and appreciate wildlife in the habitat.* USFWS.

An additional hiking trail will be developed along the Feeder Ditch leading to Lake Drummond. An interpretive auto tour route will be established along Corapeake/Sherrill/Cross/Forest Line Ditches to highlight the Atlantic white cedar and other forest-related refuge issues.

Objective: Provide opportunities for refuge visitors to view, photograph, and appreciate wildlife in the habitat as an effort to promote understanding of the impact of man's footprint on the fragile ecosystem of the Great Dismal Swamp NWR.

Strategies:

- Maintain Washington Ditch Trail and the Lake Drummond observation pier at Washington Ditch.
- Maintain approximately 50 miles of trails for foot or bike touring.
- Continue to provide access permits to nature-based tourism groups and outfitters, such as canoeing and kayaking, as well as local municipalities, to promote wildlife observation.
- Contract a concessionaire to provide canoe/kayak and bicycle rentals and interpretive boat and tram tours, based at the Desert Road facility (with a satellite at the US Highway 17 visitor facility) using the Railroad/West/Interior Ditch access.
- Using enviromentally friendly products, pave public use access route Railroad/West/Interior and maintain boat ramp.
- Develop observation/photography platform at West/Railroad intersection.

- Develop observation deck and trail at old cypress area on West Ditch Road.
- Coordinate with the Army Corps of Engineers to provide year-round water access of Lake Drummond via Feeder Ditch, to develop a foot-bridge system across the Dismal Swamp Canal to access the Feeder Ditch hiking trail, and to accommodate boat tours to Lake Drummond.
- Develop trail along Feeder Ditch to Lake Drummond.
- Develop observation tower on Feeder Ditch Trail overlooking Lake Drummond.
- Established a paved interpretive auto tour route, using enviromentally friendly products, along Corapeake/ Sherrill/Cross/ Forest Line Ditches to highlight the Atlantic white cedar and other forest-related refuge issues.
- Using enviromentally friendly products, pave public use access route Whitemarsh Road to the parking area on Washington Ditch trail.
- Using enviromentally friendly products, pave public use access route Whitemarsh Road to the parking area on Jericho Lane.
- As additional visitor facilities are developed, general access for some trails will be restricted to research and hunting only.

Program: Volunteers

Rationale for Program: In all programs volunteers are a valuable asset, bringing a unique element of local history and knowledge and, at times, providing technical assistance to refuge wildlife management activities.

Objective: Provide opportunities for people to donate their time and talents to the refuge, building community support and providing a financial savings to the Service.

Strategies:

- Identify volunteer opportunities and establish "job descriptions" for those opportunities.
- Distribute volunteer internship opportunities to colleges and universities nationally.
- Conduct two volunteer training workshops per year.
- Hold an annual volunteer recognition and appreciation event.
- Expand volunteer recruitment efforts to include local/regional/ national levels.
- Develop and implement a Junior Naturalist program to recruit new volunteers.

Program: Outreach

Rationale for Program: The Williamsburg/ Hampton Roads/Outer Banks region is rapidly becoming a densely populated urban area. Its residential population is experiencing some of the most dramatic rates of growth in Virginia. In addition to the services offered under current management, it is critical that the refuge reach beyond its immediate borders to educate the region on the Great Dismal Swamp NWR ecosystem and on how the activities around the refuge affect the health of the swamp and, in effect, the health of the surrounding communities.

Objective: Coordinate with Virginia and North Carolina state and local partners to participate in community events and provide input on local environmental issues.

Strategies:

- Continue to serve as advisors in regional government conservation planning.
- Continue to work with conservation groups, such as The Nature Conservancy and the Izaak Walton League of America to partner in finding solutions to area environmental issues.
- Continue to share refuge facilities (e.g. conference room at the refuge headquarters) with state and local agencies.
- Continue to offer off-site outreach programs, by request and as staff schedules permit, to local civic and environmental organizations with special emphasis on providing various audiences information about refuge management issues, including forest management, fire management, bear management, and protection of trust resources.

Facilities for Visitor Services

Rationale for Program: Public demand for improved visitor services was unquestionably the dominant issue presented at the public scoping meetings in January, 2002. Moreover, the establishing legislation for the refuge supported the concept of developing a visitor friendly refuge for wildlife-oriented educational and recreational activities. This concept was further corroborated and supported by the "Public Use Development Plan - Great Dismal Swamp National Wildlife Refuge" that was published by the U.S. Fish and Wildlife Service in 1979. Therefore, the vision that calls for developing major facilities for visitor services addresses a public demand, fulfills the legislated direction for the refuge,

supports a long-standing agency position, and would enhance visibility and support for the Great Dismal Swamp National Wildlife Refuge and the National Wildlife Refuge System.

Considering the large size of the refuge and the traveling time required just to traverse the perimeter of the boundary, two locations would be needed for developing adequate visitor service centers. In Suffolk, the present site of the refuge headquarters provides an ideal location to establish a Visitor Service Station to support a variety of concessionaire-operated activities, refuge outreach, and distribution of trail and refuge information. The building, now too small to meet all staffing needs, is of adequate size to allow appropriate alterations to accommodate considerable increases in visitation. In addition, the headquarters is adjacent to the Railroad Ditch Entrance, making it possible to connect this visitor service complex directly to Railroad Ditch Road, providing a safe route for public transportation to Lake Drummond. This direct road linkage would considerably improve the safety of public access to this area, as the present Railroad Ditch Entrance is located in a blind curve on Desert Road. The conversion of the present administrative headquarters facility would create the need to move staff functions to make room for the visitor services. All other staff functions would be distributed appropriately between the administrative headquarters/Visitor Center Complex on US Highway 17 in Chesapeake and the Field Operations Center at 3216 Desert Road in Suffolk.

In Chesapeake, the realignment and expansion of US Highway 17 has created an ideal location for a Refuge Visitor Center Complex. Again, this site was previously identified for the same use in the Refuge's 1979 Public Use Plan. The new highway alignment provides an area of approximately 250 acres between the highway and the Dismal Swamp Canal where interpretive and educational facilities would be constructed. Adjacent to this major highway, this location can easily support the attraction of 500,000+ visitors annually. Moreover, considerable public interest exists in providing broader educational opportunities to develop partnerships with the City of Chesapeake, Virginia Department of Game and Inland Fisheries, The Nature Conservancy, Tidewater Community College, Old Dominion University, and other educational and conservation interest.

Remaining staff, including those directly related to Operations functions, would be stationed at the Field Operations Center at 3216 Desert Road in Suffolk. Centrally located on the western flank of the refuge, this site would be most convenient for field activities considering most roads to the interior of the refuge access from the west.

To conclude, this overall development concept places visitor services, logistical operations, and administrative services at locations that would best serve the needs of the refuge. Also important is that this approach reduces the impact of development on the existing refuge land. Most of the development would occur on land already developed for refuge operations (Suffolk) or on lands procured primarily for administrative/ visitor operations (Chesapeake).

Objective: Develop administrative, operational, and visitor facilities to serve as hubs for visitor access to the refuge and administrative and operational support.

Strategies:

- Develop the administrative headquarters/Visitor Center Complex on US Highway 17 in Chesapeake, Virginia.
- Convert the existing refuge headquarters in Suffolk, Virginia, to a Visitor Service Station to support concessionaire operations and serve as a visitor services station.

Activities Considered but Eliminated from Further Consideration

Horseback Riding

The issue of horseback riding generated considerable discussion among the planning team members, since significant interest had been recorded at the scoping meetings. The planning team decided not to recommend horseback riding for inclusion in this plan due to the following issues and concerns:

- Informal discussions with state and federal land administrators revealed that while horseback riding was allowed on some public lands, significant concerns regarding the impacts to road maintenance and the possible introduction of exotic plants through horse manure existed.

- Horses would have to be transported in trailers to those refuge areas that could accommodate horseback riding. Expanded and specialized parking would have to be developed.
- Horseback riding would have to be restricted to a limited season to avoid conflicts with existing public uses and other refuge operations.
- Visitor service developments that likely include horseback riding in areas other than the refuge may be forthcoming, especially as plans for developments along US Highway 17 and the Dismal Swamp State Natural Area are completed.

To conclude, the planning team recognized, through comments provided at the scoping meetings, that horseback riders are challenged to find suitable locations for this activity. However, the management constraints that would be required to accommodate horseback riding to avoid conflicts with existing refuge activities as well as concerns over the environmental and maintenance impacts led the team to conclude that horseback riding would not be a cost-effective means of providing access into the refuge.

Ban Hunting

Some written comments suggested that all hunting be eliminated from the refuge. The Refuge Improvement Act of 1997 declares that hunting is among the priority public uses that are legitimate and appropriate for refuges. In additioin, the refuge's establishing legislation inferred that hunting is among the priority public uses to be considered for the refuge. Hunting is necessary for maintaining some wildlife populations, especially white-tailed deer, at levels that can be supported by the existing habitat. Therefore, hunting will continue to be a wildlife-dependent activity on the refuge.

Waterfowl Hunting

A suggestion was contributed at a public scoping meeting to open the refuge to waterfowl hunting. Lake Drummond is the only refuge area that is reasonably accessible to the public and that supports significant populations of wintering waterfowl. Even so, the refuge serves as a sanctuary for the waterfowl with the lake playing a key role in providing resting habitat for an estimated 10,000-15,000 tundra swans and snow geese during November-February. The waterfowl return at night to the lake for use as roost after feeding on agricultural lands east of the lake.

Unlike big game hunting for deer, a waterfowl hunt on Lake Drummond would likely drive most, if not all, tundra swans and snow geese from the refuge, for their use of the refuge is confined to the 3,000 acre lake. In contrast, the movement and use of the refuge by deer during big game hunts are not significantly affected by the hunts, since these animals are spread throughout most of the 111,201 acres of the refuge.

Lake Drummond is a valuable habitat component for wintering tundra swans and snow geese. The lake, in combination with the agricultural land on which the birds feed, has supported an estimated 30 percent of all the wintering tundra swans and snow geese in Virginia. Therefore, it was determined that it would not be desirable to disrupt this valuable component of wintering habitat.

Figure 3-7.

Great Dismal Swamp National Wildlife Refuge
Matrix of Alternatives

Goal 1:	**Manage the area for the primary purpose of protecting and preserving a unique and outstanding ecosystem, as well as protecting and perpetuating the diversity of animal and plant life therein.**		
Program/Issue:	**Alternative A "Current Management-No Action"**	**Alternative B "Service's Preferred"**	**Alternative C "Limited Habitat Management"**
GDSNWR Natural Areas		▪ Identify and designate a maximum of 1,000 acres of Atlantic white cedar forests within Unit 1 (Northeast) of the Wilderness Review as Research Natural Areas. ▪ Identify and designate a maximum of 500 acres of mesic islands as Research Natural Areas within Unit 2 (Gates County) of the Wilderness Review. ▪ Establish the 3,000 acre Lake Drummond as a Public Use Natural Area. ▪ Establish the Washington Ditch corridor as a Public use Natural Area.	
Forest Management cont.	*AWC* ▪ Issue permits to contractors who can use helicopters and/or other specialized equipment to salvage Atlantic white cedar trees that were blown down by Hurricane Isabel. ▪ Permit conditions will outline "in kind" services that will require the contractors to repairs refuge roads and provide other administrative support needed to support salvage and restoration operations. ▪ Utilize commercial harvests to develop restoration sites on 1,000 acres. ▪ Utilize approved herbicides to reduce competition from competing vegetation in mature Atlantic white cedar stands that are not easily accessible to harvesting equipment.	*AWC* ▪ Issue permits to contractors who can use helicopters and/or other specialized equpiment to salvage Atlantic white cedar trees that were blown down by Hurricane Isabel. ▪ Permit conditions will outline "in kind" services that will require the contractors to repairs refuge roads and provide other administrative support needed to support salvage and restoration operations. ▪ Utilize commercial harvests to restore 2,000 acres. ▪ Utilize herbicides to release AWC stands on 6,000 acres. ▪ Promote research partnerships to evaluate restoration techniques	▪ For Atlantic White Cedar forest areas, provide access to research and research interests. ▪ For Pine/Pocosin areas, prescribed burning will be restricted to the reduction of fuel accumulations. ▪ In other habitats, provide access to educational and research interests.

Forest Management continued	▪ Promote partnerships with state forest management agencies, research institutions, and non-government resource management organizations to develop and evaluate forest management techniques. *Pine/Pocosin* ▪ Implement hardwood removal and aggressive prescribed burning on 10,000 acres. Maintain these areas with prescribed fires occurring every 3 to 5 years. *Remnant Marsh* ▪ Maintain approximately 30 acres of the marsh that have already been restored by subjecting the area to prescribed fires every 3 to 5 years. ▪ Monitor vegetation and ground and surface water conditions to evaluate habitat maintenance techniques.	*Pine/Pocosin* ▪ Implement hardwood removal and aggressive prescribed burning on 10,000 acres. ▪ Maintain areas with prescribed fires every 3-5 years. *Remnant Marsh* ▪ Maintain 30 acres of restored marsh by prescribed burns every 3 to 5 years. ▪ Monitor vegetation and ground/surface water conditions to evaluate habitat maintenance techniques. ▪ Restore remaining acreage of the marsh utilizing mechanical clearing and prescribed burning to expand the total Remnant Marsh to 250 acres.	
Hydrologic Management cont.	▪ Conserve water to restore natural hydrologic conditions within areas where cypress, maple, and gum are the dominant habitats. ▪ Monitor surface flooding conditions to assure that abnormal flooding conditions do not interfere with ground-foraging neotropical birds. ▪ Maintain ground-water levels within one foot of the surface within Atlantic white cedar stands.	*In addition to A* • Add water control structures to the Portsmouth/East Ditch watersheds if needed to implement prescribed burning operations within pine forests north of Lake Drummond that will restore and maintain fire-dependent habitats.	▪ Conserve water to restore natural hydrologic conditions within areas where cypress, maple,and gum are th dominant habitats. ▪ Monitor surface flooding conditions to assure that abnormal surface flooding does not interfere with ground-foraging neotropical migratory birds.

Hydrologic Management *continued*	▪ Adjust water control structures as needed to inhibit flood damage to refuge roads. ▪ Promote research and survey partnerships with research institutions, Corps of Engineers, and other government organizations to improve basic knowledge and interpretation of the refuge watershed. ▪ Cooperate with adjacent landowners along the Pasquotank River to allow proper operation and maintenance of the Newland flood-control dike. ▪ Assure that refuge water conservation measures not result in flooding of adjacent neighboring private property. ▪ Continue current cooperative arrangement with the Corps of Engineers in which water release from Lake Drummond ceases at 15.75 MSL. ▪ Maintain water levels in ditches to support fire suppression and prescribed fire needs. ▪ Maintain water levels in ditches to support fire management needs in pine forests and red-cockaded woodpecker recovery areas. ▪ Support efforts to restore natural surface flow in those areas where off-refuge developments (e.g. US 158, Norfolk-Southern Railroad) create abnormally wet conditions.	• Remove beavers and nutria, using lethal means, when habitat damage or interference with water management strategies (e.g. flooding private property) is detected. • Control invasive plant species if major infestations are detected in waterways and marshes. • Develop GIS surface flooding models to provide continuous assessment of water management strategies on wildlife populations and habitat conditions	• Maintain ground-water levels within one foot of the surface within Atlantic white cedar stands. • Adjust water control structures as needed to inhibit flood damage to refuge roads. • Promote research and survey partnerships with research institutions, Corps of Engineers, and other government organizations to improve basic knowledge and interpretation of the refuge watershed. • Cooperate with adjacent landowners along the Pasquotank River to allow proper operation and maintenance of the Newland flood-control dike. • Assure that refuge water conservation measures not result in flooding of adjacent neighboring private property. • Continue current cooperative arrangement with the Corps of Engineers in which water release from Lake Drummond ceases at 15.75 MSL. • Maintain water levels in ditches to support fire suppression and prescribed fire needs.

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Fire Management	▪ Maintain 80-100 miles of roads to support fire suppression access for the refuge and Dismal Swamp State Park. ▪ Utilize lightning detection services and aerial surveys to detect wildfires during periods of high fire probability. ▪ Establish and maintain cooperative agreements with state and local fire suppression agencies to support fire detection and suppression. ▪ Implement hazard reduction burns within designated areas. ▪ Participate in wildlands urban interface programs that support reduction of fuel accumulations and development of fire breaks where off-refuge development and smoke-sensitive locations are threatened by refuge wildfires.	*In addition to A* ▪ Acquire additional access easements near the North Ditch and Corapeake Ditch to improve emergency access to isolated portions of the refuge.	▪ Maintain fire suppression capabilities necessary to complement the abilities of state and local fire suppression forces to contain and suppress wildfires within the refuge.
Additions to staff (in order of priority) for Goal 1:	Maintenance Worker Facility Manager Forester Tractor Operator Tractor Operator Equipment Operator	*In additions to A:* Forestry Technician Biological Technician	Maintenance Worker Facility Manager Tractor Operator Tractor Operator Equipment Operator

Goal 2:	Protect and enhance Service trust resources and other significant species.		
Program/Issue:	**Alternative A "Current Management-No Action"**	**Alternative B "Service's Preferred"**	**Alternative C "Limited Habitat Management"**
Red Cockaded Woodpecker Re-introduction	▪ Implement mechanical clearing and prescribed burning to restore habitat in the designated area of approximately 2000 acres appropriate for red-cockaded woodpeckers. ▪ Translocate re-cockaded woodpeckers from suitable donor population into designated areas of the refuge. ▪ Promote the Safe Harbor program to engage private landowners in recovery efforts. ▪ Install artificial nesting cavities to support woodpecker nesting.	*Same as A*	*Same as A*
Neotropical Migratory Birds	▪ Develop and support research and survey projects with partners to monitor neotropical migrant populations and habitat preferences. ▪ Support banding partnerships for neotropical migrants. ▪ Adjust water management and other refuge habitat management operations to enhance habitat for neotropical migrants; particularly Swainson's warbler.	*In addition to A:* ▪ Develop surface flooding and successional models using GIS technology to evaluate habitat conditions that affect neotropical migratory birds. ▪ Establish a neotropical migratory bird focus area near Jericho Lane. ▪ Develop clearings of 5-10 acres using tree-girdling or small clear-cuts to establish foraging areas for neotropical migratory birds. ▪ Develop a trail to the habitat management areas to enhance interpretive and educational opportunities for neotropical migratory birds. ▪ Work with Partners in Flight to promote research, education, and management of migratory birds on the refuge.	*Same as A*

Waterfowl Management	▪ Monitor and maintain existing marsh and bog restoration sites to support brood habitat for wood ducks. ▪ Monitor and manage public access to Lake Drummond to allow the area to be used by wintering tundra swans and snow geese.	*In addition to A:* ▪ Support efforts by TNC, VDGIF, and other partners to protect farmlands that are used by waterfowl from development. ▪ Evaluate need to expand refuge acquisition boundary to acquire those farmlands for waterfowl habitat.	*Same as A*
Black Bears	▪ Continue to monitor black bear populations in cooperation with the state wildlife agencies and research/educational institutions to provide adequate demographic data to guide habitat and bear population management decisions on the refuge. • Provide sites for emergency relocations of black bears in partnership with state wildlife management agencies. • Work with states to acquire data on bears harvested under crop depredation permits, bear hunting and road kills. • In partnership with the states and non-governmental organizations, seek funding to conduct studies to compliment previous refuge bear research that focuses on the demography of black bears, their genetics, population size, growth and dispersal patterns. • Cooperate with state wildlife management agencies in developing and implementing emergency response to nuisance bears and enhancing educational outreach related to bears within the refuge watershed.	*In addition to A:* • Initiate limited recreational bear hunting on the refuge (See Goal 4 / Public Use/ Hunting Opportunities.)	*Same as A*

Additions to staff (in order of priority) for Goal 2:	Park Ranger	Park Ranger	Park Ranger

Goal 3:	**Provide protection of those areas within the Great Dismal Swamp watershed that either are remnants of Dismal Swamp habitat or can be restored to Dismal Swamp habitat.**		
Program/Issue:	**Alternative A "Current Management-No Action"**	**Alternative B "Service's Preferred"**	**Alternative C "Limited Habitat Management"**
Habitat Protection and Restoration cont.	▪ Acquire the remaining properties within the current acquisition boundary when they are offered by willing sellers (approximately 4,000 acres). ▪ Cooperate and support efforts by neighboring cities and counties to restore and protect key remnants of restorable Great Dismal Swamp habitat outside the refuge acquisition boundary. ▪ Collaborate with and provide technical assistance to cities and counties when they are reviewing development proposals adjacent the refuge and within the historic range of the Great Dismal Swamp. ▪ Promote the maintenance of key wildlife corridors by recommending appropriate wildlife passages be incorporated into highway designs.	*In addition to A:* ▪ Resolve boundary disputes, post refuge boundary, and patrol/inspect boundary to detect encroachment on the refuge and criminal activities. ▪ Cooperate and support protection of 7,000 acres of PC-farmland east of the refuge to provide early successional habitat for waterfowl and other wildlife management needs within the watershed. ▪ Cooperate and support protection of 15,000 acres of seasonally flooded forests south of US 158 for neotropical migratory birds, RCW's, and black bears, and to restore surface hydrology.	*In addition to A:* ▪ Resolve boundary disputes, post refuge boundary.

Habitat Protection and Restoration continued	▪ Partner with The Nature Conservancy, state wildlife agencies, and other non-government organizations to protect and restore seasonally flooded areas within the refuge watershed. ▪ Promote hydrologic restoration when opportunities develop (e.g. US 158, Norfolk and Southern Railroad, Dismal Swamp Canal).		
Additions to staff (in order of priority) for Goal 3:		GIS Biologist	GIS Biologist

Goal 4:	Establish a public use program that will encourage awareness, understanding, appreciation and stewardship of the Great Dismal Swamp ecosystem while complementing the refuge resource management objectives.		
Program/Issue:	**Alternative A "Current Management-No Action"**	**Alternative B "Service's Preferred"**	**Alternative C "Limited Habitat Management"**
Hunting cont.	▪ *White-tail deer hunt:* By permit, in accordance with state and refuge regulations, Oct./Nov.; 13 day shotgun and archery concurrently.	• Provide an annual deer hunt program for archery and shotgun in designated areas of the Great Dismal Swamp NWR on designated days in October and November. • Provide an annual black bear hunt program in designated areas of the Great Dismal Swamp NWR on designated days in November and December. • Bear hunting parameters may be adjusted annually based on changing conditions and data. The initial hunt will be administered within the following guidelines: The harvest limit will be approximately 20 bears. If 10 or more bears are killed the first day, various parameters will be evaluated and the second hunt day may be cancelled. As with the deer hunt, no dogs will be used to hunt bears. • Coordinate with special needs organizations to identify ways to provide better hunting access for people with disabilities. • Host an annual hunter safety program at the refuge.	▪ *White-tail deer hunt:* by permit, in accordance with state and refuge regulations, Oct./Nov.; 13 day shotgun and archery concurrently. ▪ Coordinate with special needs organizations to identify ways to provide better hunting access for people with disabilities. ▪ Establish annual hunter safety program. ▪ Provide for youth hunting opportunities.

Hunting continued		• Provide for youth hunting opportunities.	
Fishing/Boating	▪ Lake Drummond - Open during daylight hours, access via Feeder Ditch, year round. ▪ Access on RR/West/ Interior April 1- June 15, by permit, during daylight hours. ▪ Support off-site fishing events with partners.	*In addition to A:* ▪ Recruit and contract private fleet of canoes and kayaks to rent. ▪ Provide guided canoe/ kayak interpretive tours through a concessionaire.	*Same as B*
Environmental Education cont.	▪ Offer teacher activity guides and Refuge videos. ▪ Encourage use of refuge as outdoor classroom. ▪ Provide field study equipment on loan. ▪ Participate in EE programs at local schools and libraries.	*In addition to A:* ▪ Partner with local universities and community colleges to develop and provide training on the Great Dismal Swamp NWR ecosystem utilizing refuge-specific teacher training for those school districts interested in providing professional development credits to their teachers. ▪ Purchase land and develop the Jericho Lane Education Pavilion. ▪ Develop other site specific biological and historical educational media, utilizing the latest technology and in compliance with Virginia and North Carolina state academic standards. ▪ Present at local, regional, and national education conferences to encourage teachers to discover the Great Dismal Swamp with their students. ▪ Establish partnerships with local elder hostel programs. ▪ Develop and implement a Junior Naturalist program in the region.	*Same as B*

Environmental Education continued		▪ Establish a cooperating agreement with the region's school systems to provide specific environmental education programs which incorporate refuge-specific service learning activities. ▪ Establish a library and resource center for teachers and students. ▪ Utilize the latest technology to share the refuge environmental education program with those unable to visit.	
Interpretation *cont.*	▪ Produce and provide refuge publications on general refuge information and current issues. ▪ Provide occasional staff/ volunteer-led orientation & programs at refuge headquarters emphasizing refuge issues. ▪ Provide occasional staff/ volunteer-led orientation & walks at Washington Ditch & Jericho Lane. ▪ Provide occasional off-site programs at schools, libraries, and civic meetings. ▪ Maintain current interpretive panels, boardwalks and kiosks at Washington Ditch & Jericho Lane. ▪ Continue to exhibit at local festivals and events as staff time permits.	▪ Produce and provide refuge publications on general refuge information and current issues. ▪ Provide year-round interpretive programs at several key locations around the refuge, in both North Carolina and Virginia. ▪ Expand natural history interpretation to include programs focused on resource management issues such as fire, Atlantic white cedar, red cockaded woodpeckers, bears and other urban conflicts of importance to the swamp ecosystem. ▪ Expand cultural history interpretation to include programs focused on human impact on the swamp, timber and economic resources of the swamp, the Underground Railroad, and the Dismal Swamp Canal.	▪ Produce and provide refuge publications on general refuge information and current issues. ▪ Provide year-round interpretive programs at several key locations around the refuge, in both North Carolina and Virginia. ▪ Expand natural history interpretation to include programs focused on resource management issues such as fire, Atlantic white cedar, red cockaded woodpeckers, bears and other urban conflicts of importance to the swamp ecosystem. ▪ Expand cultural history interpretation to include programs focused on human impact on the swamp, timber and economic resources of the swamp, the Underground Railroad, and the Dismal Swamp Canal.

Interpretation continued		▪ Host annual events highlighting celebrations such as International Migratory Bird Day, National Wildlife Refuge Week, National Public Lands Day and the Great Dismal Swamp NWR anniversary. ▪ Update and maintain interpretive panels, boardwalks, and kiosks at Washington Ditch and Jericho Lane. ▪ Update and maintain interpretive panels and kiosks on Railroad/West/ Interior Trail and Feeder Ditch Trail. ▪ Develop and maintain kiosk at Dismal Swamp Canal Visitor Center (under NCDOT). ▪ Contract a concessionaire to provide interpretive boat tours on Lake Drummond. ▪ Partner with the City of Suffolk to develop Great Dismal Swamp exhibits for their visitor center. ▪ Develop interpretive exhibits and programs for the US 17 facility to serve both the refuge's North Carolina and Virginia communities and the visiting public. ▪ Develop interpretive exhibits and materials for the Jericho Lane Education Pavilion. ▪ Develop and produce interpretive materials for handouts. ▪ Develop interpretive exhibits and programs for a visitor contact station at Sunbury, NC to orient visitors traveling east toward Virginia Beach and the Outer Banks.	▪ Host annual events highlighting celebrations such as International Migratory Bird Day, National Wildlife Refuge Week, National Public Lands Day and the Great Dismal Swamp NWR anniversary ▪ Update and maintain interpretive panels, boardwalks, and kiosks at Washington Ditch and Jericho Lane. ▪ Update and maintain interpretive panels and kiosks on Railroad/West/ Interior Trail and Feeder Ditch Trail. ▪ Develop and maintain kiosk at Dismal Swamp Canal Visitor Center (under NCDOT). ▪ Contract a concessionaire to provide interpretive boat tours on Lake Drummond. ▪ Partner with the City of Suffolk to develop Great Dismal Swamp exhibits for their City Visitor Center. ▪ Develop interpretive exhibits and materials for the Jericho Lane Education Pavilion. ▪ Develop interpretive exhibits and programs for the US 17 facility to serve both the refuge's North Carolina and Virginia communities and the visiting public. ▪ Develop and produce interpretive materials for handouts.

Wildlife Observation & Photography *cont.*	▪ Maintain Washington Ditch Trail and the Lake Drummond observation pier at Washington Ditch. ▪ Maintain approximately 50 miles of trails for foot or bike touring. ▪ Continue to provide access permits to nature-based tourism groups and outfitters, such as canoeing and kayaking, as well as local municipalities, to promote wildlife observation. ▪ Maintain Railroad/ West/ Interior Ditch trail and boat ramp. ▪ Continue to provide auto access permits onto Railroad/ West/ Interior Ditch Roads to Lake Drummond. ▪ Coordinate with the Army Corps of Engineers to provide year-round water access of Lake Drummond via Feeder Ditch	▪ Maintain Washington Ditch Trail and the Lake Drummond observation pier at Washington Ditch. ▪ Maintain approximately 50 miles of trails for foot or bike touring. ▪ Continue to provide access permits to nature-based tourism groups and outfitters, such as canoeing and kayaking, as well as local municipalities, to promote wildlife observation. ▪ Contract a concessionaire to provide canoe/kayak and bicycle rentals and interpretive boat tours, based at the Desert Road facility (with a satellite at the US 17 visitor facility) using the Railroad/ West/ Interior Ditch access. ▪ Using environmentally friendly materials, pave public use access route Railroad/West/Interior and maintain boat ramp. ▪ Develop observation/ photography platform at West/Railroad intersection. ▪ Develop observation deck and trail at old cypress area on West Ditch Road. ▪ Coordinate with the Army Corps of Engineers to provide year-round water access of Lake Drummond via Feeder Ditch, to develop a foot-bridge system across the Dismal Swamp Canal to access the Feeder Ditch hiking trail, and to accommodate boat tours to Lake Drummond. ▪ Develop trail along Feeder Ditch to Lake Drummond.	***Same as B***

Wildlife observation and photography continued		▪ Develop observation tower on Feeder Ditch Trail overlooking Lake Drummond. ▪ Using environmentally friendly materials, establish a paved interpretive auto tour route along Corapeake, Sherrill, Cross and Forest Line Ditches to highlight the Atlantic white cedar and other forest-related refuge issues. ▪ Using environmentally friendly materials, pave public use access route from White Marsh Road to parking area on Washington Ditch Trail. ▪ Using environmentally friendly materials, pave public use access route from White Marsh Road to parking area on Jericho Lane. ▪ As additional visitor facilities are developed, general access for some trails will be restricted to research and hunting only.	
Volunteers	▪ Establish "job descriptions' for identified volunteer opportunities. ▪ Distribute volunteer internship opportunities to local colleges and universities. ▪ Conduct two volunteer training workshops per year. ▪ Hold an annual volunteer recognition program. ▪ Recruit volunteers through on-site contacts, media releases, and on and off-site programs.	▪ Identify volunteer opportunities and establish "job descriptions" for those opportunities. ▪ Distribute volunteer internship opportunities to colleges and universities nationally. ▪ Conduct two volunteer training workshops per year. ▪ Hold an annual volunteer recognition and appreciation event. ▪ Expand volunteer recruitment efforts to include local/regional/national levels. ▪ Develop and implement a Junior Naturalist program to recruit new volunteers. ▪ Establish RV campsite pads with electric, water and sewer for 2-3 month term volunteers.	▪ Identify volunteer opportunities and establish "job descriptions" for those opportunities. ▪ Distribute volunteer internship opportunities to colleges and universities nationally. ▪ Conduct two volunteer training workshops per year. ▪ Hold an annual volunteer recognition and appreciation event. ▪ Expand volunteer recruitment efforts to include local/regional/national levels. ▪ Develop and implement a Junior Naturalist program to recruit new volunteers.

Outreach	▪ Serve as advisors in regional government planning. ▪ Work with conservation groups to partner in finding solutions to area environmental issues. ▪ Share refuge headquarters with state and local agencies. ▪ Offer off-site outreach programs, by request and as staff schedules permit, to local civic and environmental organizations with special emphasis on providing various audiences information about refuge management issues, including forest management, fire management, bear management, and protection of trust resources.	*Same as A*	*Same as A*
Facilities	▪ Assist visitors at refuge headquarters for orientation and information; Mon-Fri, 7:30 am- 4:00 pm.	▪ Develop the administrative headquarters/Visitor Center Complex on US Highway 17 in Chesapeake, VA. ▪ Convert the existing refuge headquarters in Suffolk, VA to support concessionaire operations and serve as a visitor services station. ▪ Establish a Refuge Contact Station in Sunbury, NC.	▪ Develop the administrative headquarters/Visitor Center Complex on US Highway 17 in Chesapeake, VA. ▪ Convert the existing refuge headquarters in Suffolk, VA to support concessionaire operations and serve as a visitor services station.
Additions to staff (in order of priority) for Goal 4:		• Recreation Aid • (2) Assistant Park Rangers • Volunteer Coordinator (Park Ranger) • Lead EE Specialist (Park Ranger) • Director of Visitor Services (Park Ranger)	*Same as B*

Nansemond National Wildlife Refuge

Alternative A: Current Management

Nansemond National Wildlife Refuge. *Opportunities limited to management and preservation of open space. USFWS.*

Program/Goal: Maintain custodial management of the refuge

Rationale: Nansemond NWR was established in 1973 when the Department of Defense transferred 206 acres of land, primarily tidal marsh, to the Department of the Interior. In 1999, the refuge expanded to 423 acres when land was added from the adjacent Driver Naval Transmitter Facility. The addition to the refuge consisted primarily of upland areas that were frequently mown to maintain cleared space for the tall radio transmission towers that once existed on these areas.

The refuge is too small to make a significant contribution to wildlife management priorities of the Service, and expansion of the refuge is not desirable or feasible due to the considerable development that has occurred within the Nansemond River watershed. Therefore, expanding Service operations on this unit is not desirable or feasible.

Strategies:

- Periodically inspect and maintain posted boundaries.
- Respond to any encroachment and violation of refuge regulations on the property.

Alternative B: Service's Preferred Alternative

Program/Goal: Aggressively pursue partnerships to support the management and stewardship of Nansemond NWR

Rationale: Nansemond NWR was established in 1973 when the Department of Defense transferred 206 acres of land, primarily tidal marsh, to the Department of the Interior. In 1999, the refuge expanded to 423 acres when land was added from the adjacent Driver Naval Transmitter Facility. The addition to the refuge consisted primarily of upland areas that were frequently mown to maintain cleared space for the tall radio transmission towers that used to exist on these areas.

The refuge is too small to make a significant contribution to wildlife management priorities of the Service, and expansion of the refuge is not desirable or feasible due to the considerable development that has occurred within the Nansemond River watershed. Therefore, expanding Service operations on this unit is not desirable or feasible. In addition, no formal Wilderness Review has been completed at this time. The refuge's small size and the developed nature of the surrounding landscape make it unsuitable for wilderness designation.

The upland area within the refuge has a history of spot contamination, including PCB contamination, from transformers that used to serve the naval transmitter towers. Therefore, development opportunities would be limited and would likely be confined to management and preservation of open space.

Objective: Pursue partnerships for the management and stewardship of Nansemond National Wildlife Refuge.

Rationale for Objective: Partnerships would expand the range of management options for the refuge beyond the custodial level provided by the Service.

Strategy:

- Periodically inspect and maintain posted boundaries.
- Respond to any encroachment and violation of refuge regulations on the property.
- Pursue partnership discussions with city, state, and Native American representatives who have resource management, interpretive, or educational programs that require relatively undeveloped open space.

Figure 3-8

Nansemond National Wildlife Refuge
Matrix of Alternatives

Program/ Issue:	Alternative A "Current Management-No Action"	Alternative B "Service's Preferred"
Refuge Management	▪ Periodically inspect and maintain posted boundaries. ▪ Respond to any encroachment and violation of refuge regulations on the property.	▪ Pursue partnership discussions with city, state, and Native American representatives who have resource management, interpretive, or educational programs that require relatively undeveloped open space.